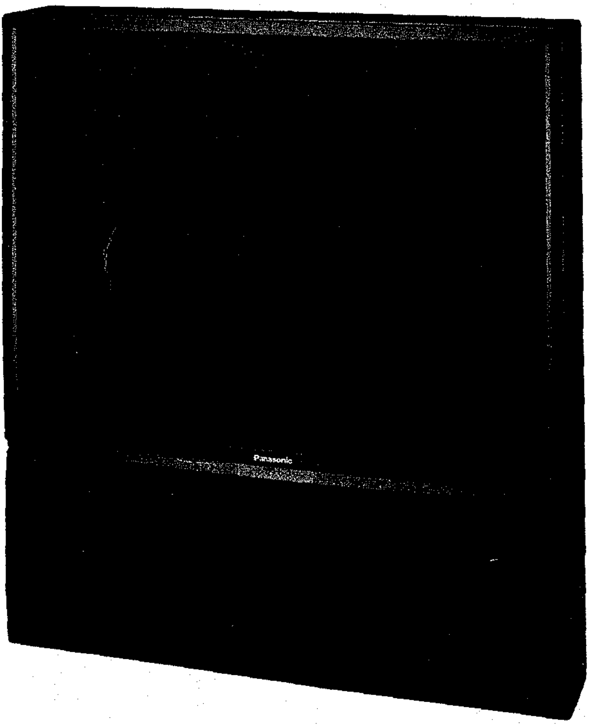
ORDER NO. MTC9903012C1
B2

Service Manual

Color Video Projection System

VIDE-V29260

Main Manual
(P3)



Panasonic

Models	Chassis
PT-51G44A	**AP815**
PT-51G44CA	**AP815**
PT-51G54A	**AP815**
PT-51G54CA	**AP815**
PT-61G54A	**BP815**
PT-61G54CA	**BP815**

Note: Refer to Technical Guide (P3) for functional descriptions and Block Diagrams. **(MTC9703689G1).**

This Service manual is issued as a service guide for the models of the **P3** family listed above. Included in this manual are a set of schematic, block diagrams, functional descriptions, alignment procedures, disassembly procedures, and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this Main Manual.

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Important Safety Notice

Special components are used in this projection television which are important for safety. These components are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent x-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An ***isolation transformer*** should always be used during the servicing of a PTV whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the PTV from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always replace protective devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the PTV. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials are present when this PTV is operating. Operation of the PTV without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **handling the *picture tube*.** Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X-ray radiation.

The **test picture tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against X-ray radiation as well as implosion. The magnetic shield limits the X-ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 31kV without causing X-ray radiation.

Before returning a serviced PTV to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (See Figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15µF capacitor between and exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other expose metallic parts.

Verify any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the PTV must be repaired and rechecked before it is returned to the customer.

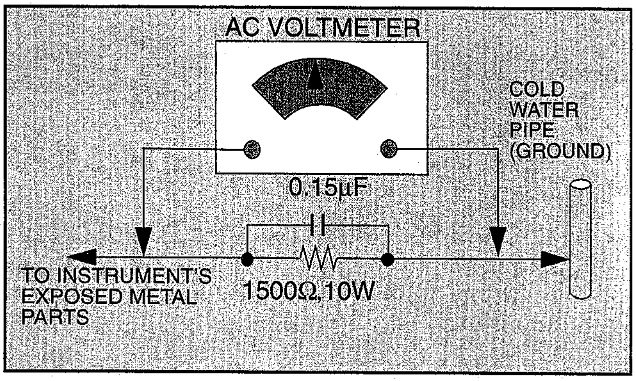

Figure 1. **Hot Check Circuit**

Insulation Test

Connect an insulation tester between an exposed metallic part and AC line.

Apply 1080VAC/60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X-ray Radiation

WARNING: The potential source of X-ray radiation in the PTV set is in the High V. section and the projection tubes.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high should be 31.5kV ± 1.0kV. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Important Safety Tests

Measuring H.V. ⚠

The anode caps are cemented to the CRTs. To gain access for high voltage measurement, remove the red CRT's anode lead from the flyback transformer (FBT) distributor. Grasp the anode lead protective cap at its bottom and squeeze it against the locking cap body inside. Rotate 1/4 turn counter clockwise and pull the anode lead sleeve out of the FBT distributor. Connect a high voltage lead (+) from your H.V. meter to the FBT distributor, and the common (-) to cold ground (⏚). (See Figure 2).

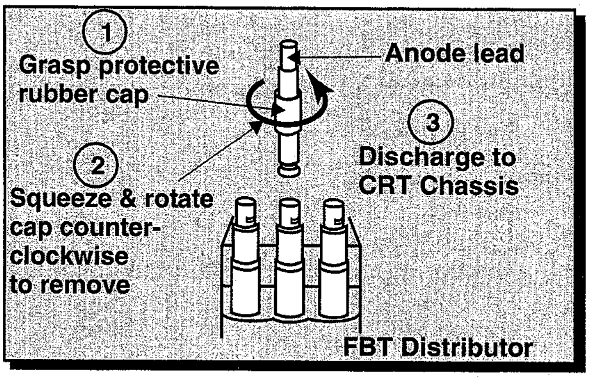
①
Grasp protective rubber cap
Anode lead
③
Discharge to CRT Chassis
②
Squeeze & rotate cap counter-clockwise to remove
FBT Distributor

Figure 2. **Removal of FBT leads**

Note: *Reinsert the anode lead into the FBT distributor until it is tightly and fully seated. Turn the locking cap clockwise to lock in place.*

EHT Protector Operation Check

With the cabinet back removed, apply a nominal 120V AC to the PTV.

Over Voltage Test

Preparation:

1. Turn Receiver "OFF"
2. Connect an NTSC signal generator to the antenna terminal.
3. Connect DVM (+) TPD4 and (-) TPD5 on D-Board.(See Figure 3)

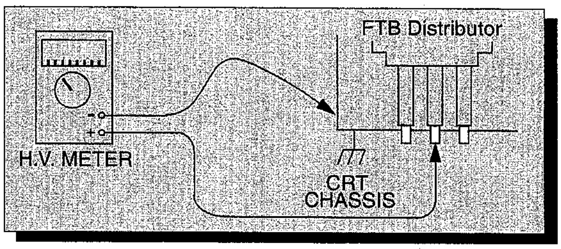

Figure 3. Measuring H.V.

4. Connect a H.V. meter (static type, class 0.1) with high voltage leads to high voltage distributor on FBT.(See Figure 4)

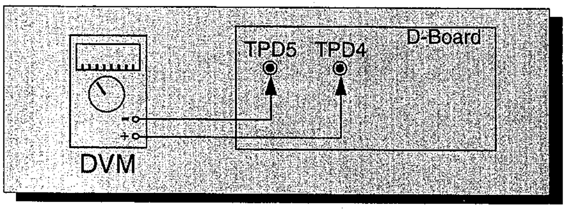

Figure 4. DVM connected to D-Board.

5. Connect the 8 ~ 15 V DC variable power supply to (+) TPB10 and (-) TPBGND, on B-Board.

Procedures:

1. Apply a monoscope pattern.
2. Adjust the Picture or Brightness controls so that the DVM reads 17.5 volts ± 0.5 volts.
3. Increase the variable power supply until set turns off. The set should turn off at 17.5 volts ± 0.5 volts (DVM) and high voltage less than 35.5kV.
4. If the DVM reading is other than 17.5volt (± 0.5 volts), repeat steps 2 and 3.
5. Turn off the variable supply and confirm that the set will turn on with the Remote Control.

CRT Protect Circuit

This circuit blanks the CRT in the event that there is a loss of vertical sweep. The circuit is not adjustable; however the circuit should be checked each time service is performed.

To check circuit:

1. Turn the Receiver On an select an active channel.
2. Adjust Brightness and Picture controls for a visible picture.
3. On D-Board momentarily connect a short-jumper from TPD2 to TPDGND. The CRT should blank. If this does not occur, repair must be performed before returning receiver to customer.

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- D-Board....................Sheet-5A
- K-Board....................Sheet-5A
- LR-Board...................Sheet-1B
- LG-Board...................Sheet-1B
- LB-Board...................Sheet-1B
- R-Board....................Sheet-5A
- S-Board....................Sheet-5A
- X-Board....................Sheet-3B
- Y-Board....................Sheet-3B
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- T-Board....................Sheet-4B

LAYOUTS

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- C-Board....................Sheet-2B
- D-Board....................Sheet-5A
- K-Board....................Sheet-5A
- LR-Board...................Sheet-1B
- LG-Board...................Sheet-1B
- LB-Board...................Sheet-1B
- R-Board....................Sheet-5A
- S-Board....................Sheet-5A
- X-Board....................Sheet-3B
- Y-Board....................Sheet-3B
- YC-Board Sheet-4B
- T-Board....................Sheet-4B

Service Notes

Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color on the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicated the type and the second letter, the grade of transistor.

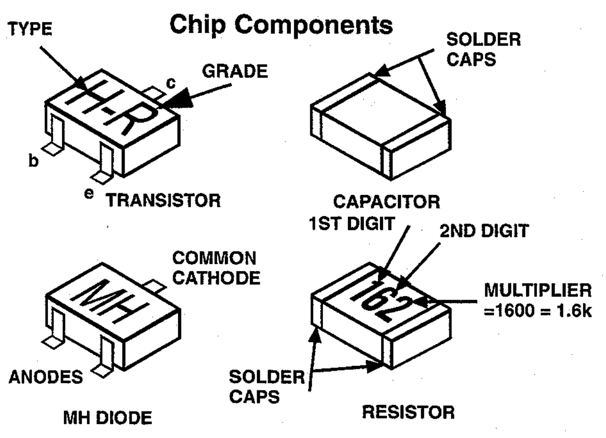
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watts iron until solder flows. Do not apply heat for more than 3 seconds.

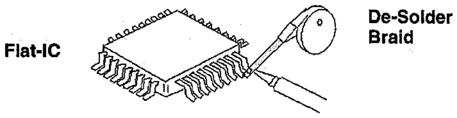

Chip Components
TYPE
GRADE
c
b
e
H-R
TRANSISTOR
SOLDER CAPS
CAPACITOR
1ST DIGIT
2ND DIGIT
MULTIPLIER =1600 = 1.6k
162
COMMON CATHODE
MH
ANODES
MH DIODE
SOLDER CAPS
RESISTOR

How to Replace Flat-IC

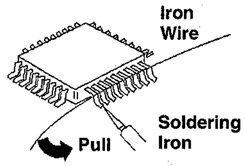
- Required Tools -

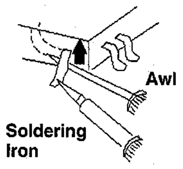
- Soldering iron
- De-solder braids
- Iron wire or small awl
- Magnifier

1. Remove the solder from all of the pins of a Flat-IC by using a de-solder braid.

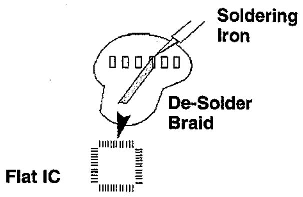

Flat-IC
De-Solder Braid

2. Put the iron wire under the pins of the Flat-IC and pull it in the direction indicated while heating the pins using a soldering iron. a small awl can be used instead of the iron wire.

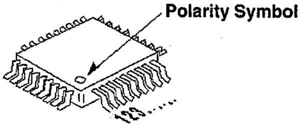

Iron Wire
Soldering Iron
Pull


Awl
Soldering Iron

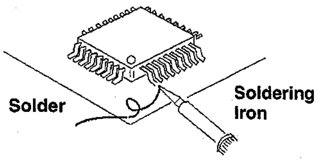
3. Remove the solder from all the pads of the Flat-IC by using a de-solder braid.


Soldering Iron
De-Solder Braid
Flat IC

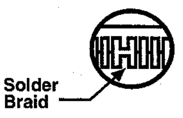
4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Properly determine the position of the soldering pads and pins by correctly aligning the polarity symbol.

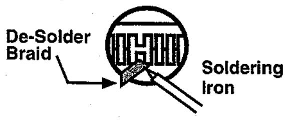

Polarity Symbol

5. Solder all pins to the soldering pads using a fine tipped soldering iron.


Solder
Soldering Iron

6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.


Solder Braid


De-Solder Braid
Soldering Iron

Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CTR DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the PTV to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground ((⏚) or (⏊)) when servicing, or incorrect voltages will be measured.

WARNING: This PTV has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers listed in this service manual, or provide the chassis number and the part reference number.

For optimum performance and readability, all other parts should be replaced with components of identical specification.

FEATURE TABLE

FEATURE\MODEL	PT-51G44A PT-51G44CA	PT-51G54A PT-51G54CA	PT-61G54A PT-61G54CA
Chassis	P3	P3	P3
Tuning system	40K	40K	40K
# of channels	181	181	181
Menu language	Eng/Span/Fr	Eng/Span/Fr	Eng/Span/Fr
Closed Caption	X	X	X
V-Chip	X	X	X
75 Ω input	X	X	X
Picture In Picture	2T	2T	2T
Remote Model #	EUR511110	EUR511171B	EUR511171B
Protector of Screen	--	X	X
Comb Filter	3DIG	3DIG	3DIG
V/A norm (X=both)	X	X	X
Dyn Color/Peak Wht	X	X	X
Digital Convergence	X	X	X
MTS/SAP/DBX	X	X	X
Bass/Bl/Treb Control	X	X	X
AI Sound (DXL:*,SMPL:X)	X	X	X
Surround	X	X	X
Built-in audio power	10W/CH (10%)	10W/CH (10%)	10W/CH (10%)
# of speakers	2	2	2
A/V in (rear/front)	(2/0)	(2/0)	(2/0)
S-VHS IN (rear/front)	1/0	1/0	1/0
Audio Out (F:FAO;V:VAO	F,V	F,V	F,V
Dimensions (WxDxH) mm in	1098x633x1329 43.15x24.87x52.22	1098x633x1329 43.15x24.87x52.22	1316x704x1513 51.71x27.66x59.4
Weight (kg/lbs)	92/202.4	92/202.4	116/255.2
Power source (V/Hz)	120/60	120/60	120/60
Anode voltage	31.5kV ± 1.0kV	31.5kV ± 1.0kV	31.5kV ± 1.0kV
Video input jack	$1V_{p\text{-}p}$ 75Ω, phono jack	$1V_{p\text{-}p}$ 75Ω, phono jack	$1V_{p\text{-}p}$ 75Ω, phono jack
Audio input jack	500mV RMS 47kΩ	500mV RMS 47kΩ	500mV RMS 47kΩ

Table 1: Feature Table

Specifications are subject to change without notice or obligation.
Dimensions and weights are approximate.

Boards Designation

Board	Part Number	Designation
A-Board	TNP2AH010AC	Main Chassis
B-Board	TNPH0121AF	Power Supply
C-Board	TNPA1513	Convergence
D-Board	TNPA0609	Protection Circuit
K-Board	TNPA0614	Costumer Controls
LR-Board	TNPA0610	Red CRT Board
LG-Board	TNPA0611	Green CRT Board
LB-Board	TNPA0612	Blue CRT Board
R-Board	TNPA0615	Remote Sensor
S-Board	TNPA0190AG	2nd Tuner
T-Board	TNP2AA045AB	Line Filter
X-Board	TNPA0613AB	A/V Inputs
Y-Board	TNP2AA009AE	PIP Processing
YC-Board	TNP2AA032	Digital 3-Line Comb Filter

Note: ***The C-Board (TNPA1513) is Non-Serviceable,*** *If the Board is defective, replace the board with a new one, and return the defective Board to the Service Center.*

Location of Controls (Receiver)

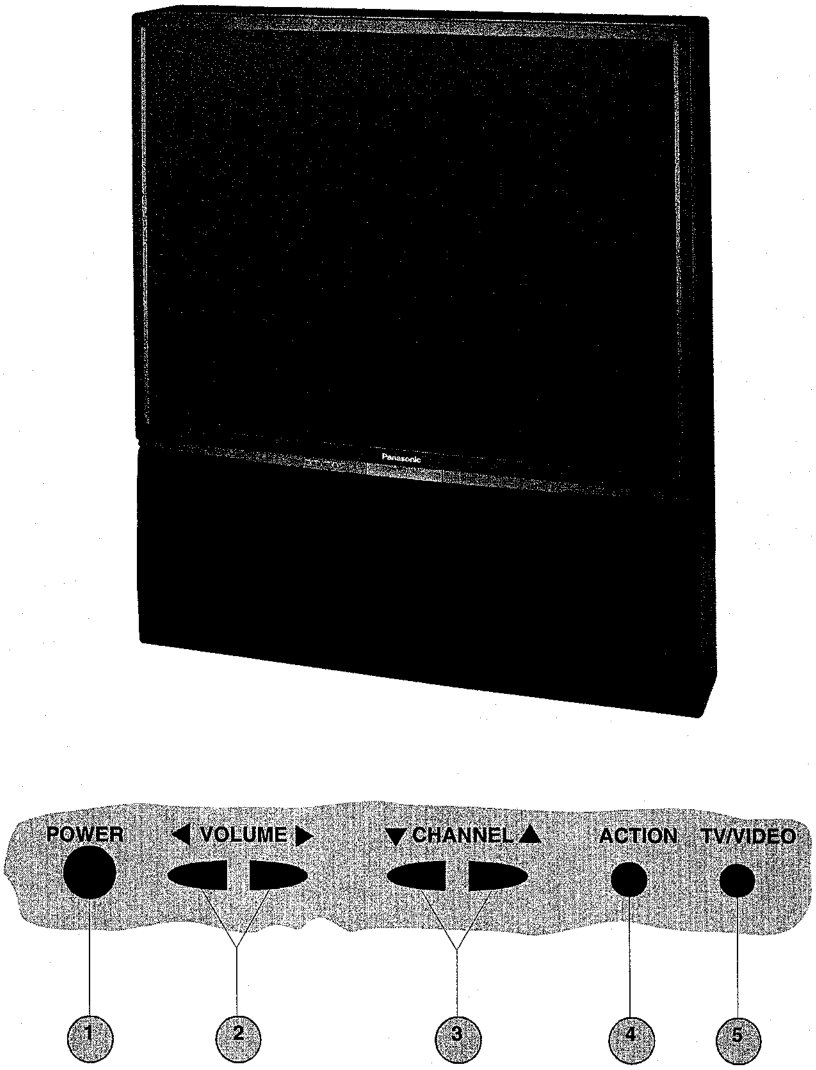


Figure 5. Location of Controls Receiver

Quick Reference Control Operation

	Quick Reference Control Operation
①	**Power Button -** Press to turn ON or OFF.
②	**Volume Buttons -** Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed
③	**Channel Buttons -** Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select Cable Converter box channels after programming Remote Control Infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
④	**Action Button -** Press to display Main Menu and access On Screen feature and Adjustment Menus.
⑤	**TV/Video Button -** Press to select TV or one of two Video Inputs, for the Main Picture or the PIP frame (when PIP frame is displayed).

Location of Controls (Remote)

POWER Button

Press to turn ON and OFF.

MUTE Button

Press to mute sound.
A second press resumes sound.
Press also to access and delete Closed Caption display.

VCR, DVD, LD/CD, AUX, TV, CBL, DBS, RCVR

Component function buttons

VOL (volume) Buttons

Press to adjust TV sound level.
Use with Channel buttons to navigate in menus.

R-TUNE (Rapid Tune) Button.

Press to switch to the previous channel.

ACTION Button

Press to display Main Menu and access or exit On Screen features and Adjustment Menus.

REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC, VCR CHANNEL

Component function buttons.

DBS EXIT, DBS GUIDE

DBS function buttons.

MULTI Button

Programmable button that can operate up to seven (7) functions at once

TV/VIDEO Button

Press to select TV or Video input.

CH (channel) Buttons

Press to select channels.
Use with volume buttons to navigate in menus.

DBS EXIT, DBS GUIDE

DBS function buttons.

RECALL Button

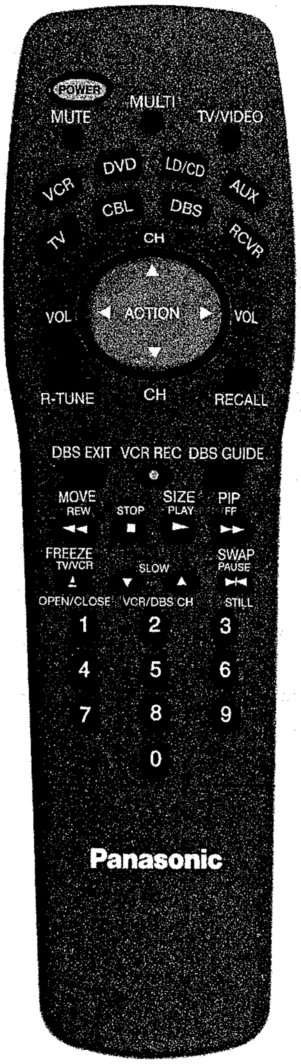
Press to display Time, status of Sleep Timer, Channel, Video mode and Channel Caption (Station Identifier).

OPEN/CLOSE, SLOW, STILL

DVD function buttons.

"0" - "9"

Press numeric keypad to select any channel.


POWER
MULTI
MUTE
TV/VIDEO
DVD
LD/CD
VCR
AUX
CBL
DBS
TV
RCVR
CH
VOL
ACTION
VOL
R-TUNE
CH
RECALL
DBS EXIT
VCR REC
DBS GUIDE
MOVE
REW
STOP
SIZE
PLAY
PIP
FF
FREEZE
TV/VCR
SLOW
SWAP
PAUSE
OPEN/CLOSE
VCR/DBS CH
STILL
1
2
3
4
5
6
7
8
9
0
Panasonic

EUR511171B
PT-51G54A/CA
PT-61G54A/CA

Figure 6. Location of Controls (Remote)

For additional information on this Remote and its operation, please refer to the Remote Guide, listed on the parts list.

Location of Controls (Remote)

POWER Button

Press to turn ON and OFF.

MUTE Button

Press to mute sound.
A second press resumes sound.
Press also to access and delete Closed Caption display.

TV CABLE VCR DVD/LD

Component function buttons

VOL (volume) Buttons

Press to adjust TV sound level.
Use with Channel buttons to navigate in menus.

R-TUNE (Rapid Tune) Button.

Press to switch to the previous channel.

ACTION Button

Press to display Main Menu and access or exit On Screen features and Adjustment Menus.

REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC, VCR CHANNEL

Component function buttons.

MULTI Button

Programmable button that can operate up to seven (7) functions at once

TV/VIDEO Button

Press to select TV or Video input.

CH (channel) Buttons

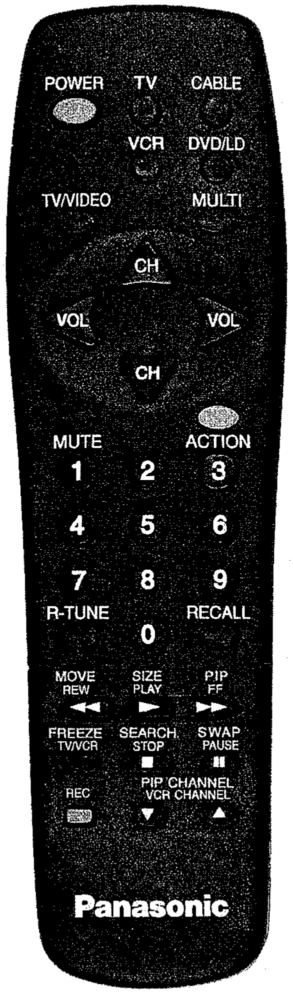
Press to select channels.
Use with volume buttons to navigate in menus.

RECALL Button

Press to display Time, status of Sleep Timer, Channel, Video mode and Channel Caption (Station Identifier).

"0" - "9"

Press numeric keypad to select any channel.


POWER
TV
CABLE
VCR
DVD/LD
TV/VIDEO
MULTI
CH
VOL
VOL
CH
MUTE
ACTION
1
2
3
4
5
6
7
8
9
R-TUNE
RECALL
0
MOVE REW
SIZE PLAY
PIP FF
FREEZE TV/VCR
SEARCH STOP
SWAP PAUSE
REC
PIP CHANNEL VCR CHANNEL
Panasonic

EUR511110
PT-51G44/C

Figure 7. Location of Controls (Remote)

For additional information on this Remote and its operation, please refer to the Remote Guide, listed on the parts list.

Disassembly for Service

Note: Board ground wires may have to be disconnected to disassemble some boards. All ground wires must be reconnected using jumper leads, if necessary, before power is applied to Receiver for service.

Front Decorative Panel Removal

(See Figure 8.)

1. The Front Decorative Panel is secured by velcro strips. Grip the panel from the sides and pull forward to remove.
2. The Front Cover is secured by screws.

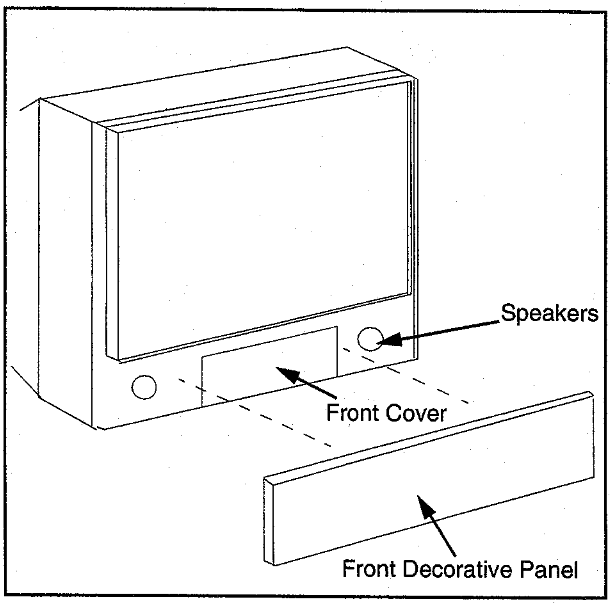

Speakers
Front Cover
Front Decorative Panel

Figure 8. Panel Removal.

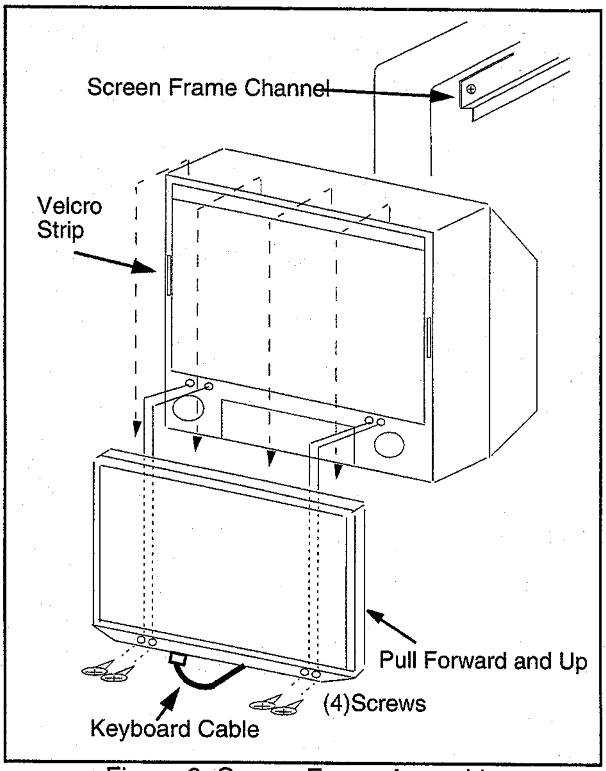

Screen Frame Channel
Velcro Strip
Pull Forward and Up
(4)Screws
Keyboard Cable

Figure 9. Screen Frame Assembly.

Screen Frame Assembly (See Figure 9)

1. Remove the front decorative panel. (see Figure 8)
2. Remove 4 screws from the bottom edge of the frame.
3. Unplug the keyboard cable from the bottom of the screen frame.
4. Grasp the frame on the sides at the bottom. Pull forward at bottom, push up frame then pull out top edge.

Screen (See Figure 10)

1. Place frame face down on soft surface.
2. Remove Frame Channel from top edge.
3. Remove screen brackets.
4. Remove K-Board.

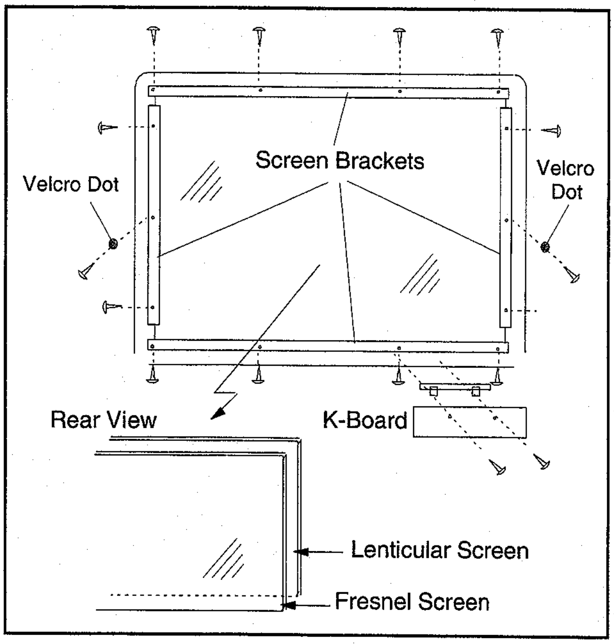

Screen Brackets
Velcro Dot
Velcro Dot
Rear View
K-Board
Lenticular Screen
Fresnel Screen

Figure 10. Screen Assembly

Disassembly for Service (Cont.)

Disassembly of Speaker Units Replacement

1. Remove the front decorative panel located under control panel. (see Figure 8)
2. Each Left and Right speaker is secured to the cabinet with (4) screws for each bracket.
3. Disconnect the R & L speaker lead connectors from the speaker units.

Bottom Back Cover (Figure 11)

1. Remove (8) hex screws around its perimeter (marked with arrows).
2. Remove (3) screws from around the A/V terminal board (marked with arrows).

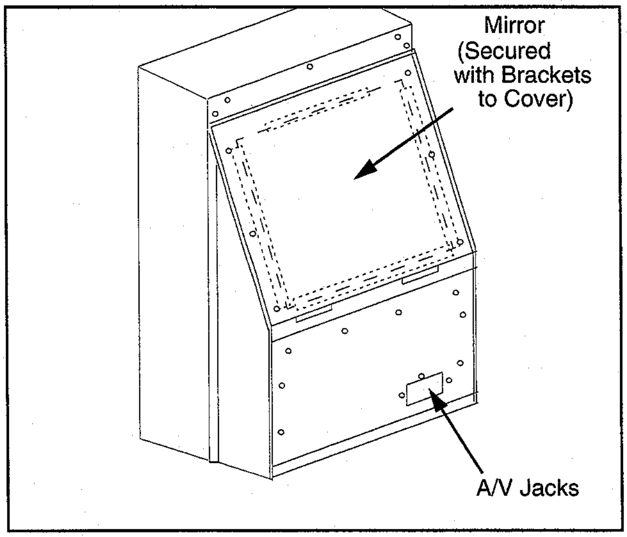


Figure 11. Back Covers Removal

Back Cover Assembly (Figure 11)

1. The top back cover is secured with (6) screws around its perimeter.
2. Lift bottom cover up and pull out at the bottom.
3. Be careful not to damage the mirror attached to the underside of cover.

Main Chassis Block (Figure 12)

1. Remove Front Decorative Panel and Front Cover. (Figure 8)
2. Remove the Bottom Back Cover. (Figure 11)
3. The main chassis Block is secured to the cabinet by (4) screws (2 at front, behind the decorative panel, 2 inside on bottom of optical frame).
4. Remove Wires (K1 connector and Speaker connectors, A8 & A9, on A-Board) and Pull out the Main Chassis Block.

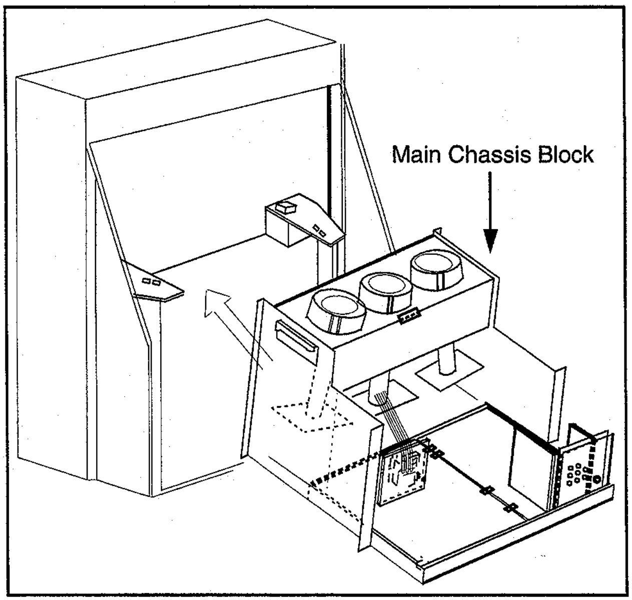


Figure 12. Chassis Removal

Note: *Main Chassis block can be serviced either in normal position or laying on its back side (Protect hookup terminal from damage).*

Disassembly for CRT Replacement

To facilitate CRT replacement, the complete CRT mounting chassis does not need to be removed.

1. Remove the main chassis block from the cabinet (Figure 12),
2. Remove the Optical bracket metal cover (rear side) by removing (6) screws from back, (2) screws from top, and (2) screws from each side. (Figure 13)

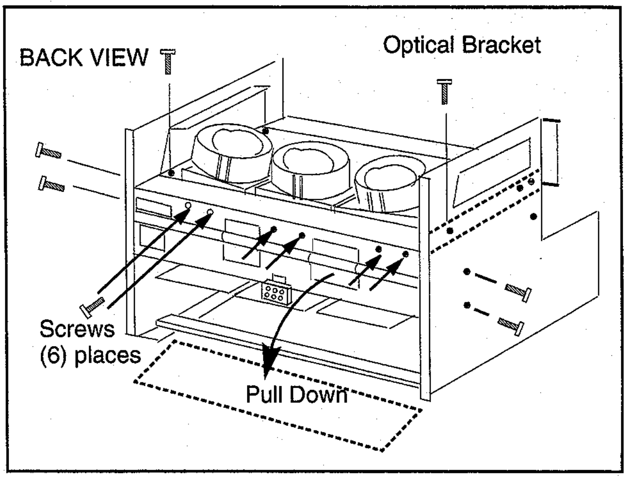


Figure 13. CRT Replacement

Disassembly for Service (Cont.)

3. Remove the defective CRT anode lead from the high voltage distributor block that is mounted on the Flyback Transformer. Discharge to CRT chassis.
4. Unplug connectors from the B-Board. (See board layout.) B9 for Red, B10 for Green, or B11 for Blue.
5. Unplug the defective CRT black Dag ground connector from the CRT Board.
6. Remove the CRT Board from the defective CRT neck.
7. Remove (2) screws from the defective CRT housing (Figure 14).**

CAUTION: Do not remove the (4) CRT lens screws.

8. Release CRT anode lead from CRT chassis wire clamp and all other wires from holders.
9. Loosen a screw that secured the DY and remove it from the CRT neck.

X-RAYS SHIELD ⚠

10. To insure X-Rays radiation protection, the lens must be mounted in place at all times when power is applied to the receiver.

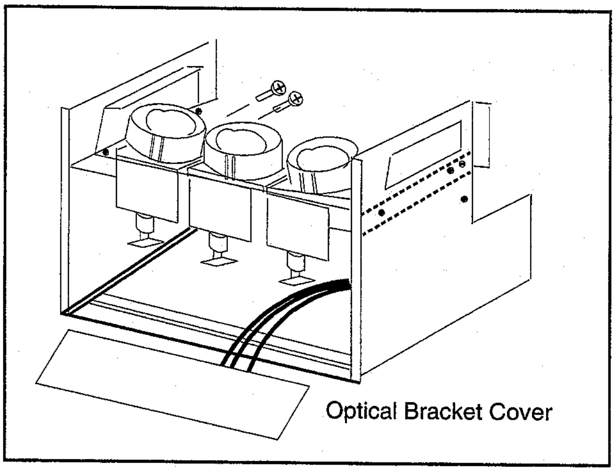


Figure 14. CRT Replacement.

CAUTION: Support the CRT Assembly when loosening screws.

CRT Replacement

1. Remove CRT focus lens assembly (4 screws).

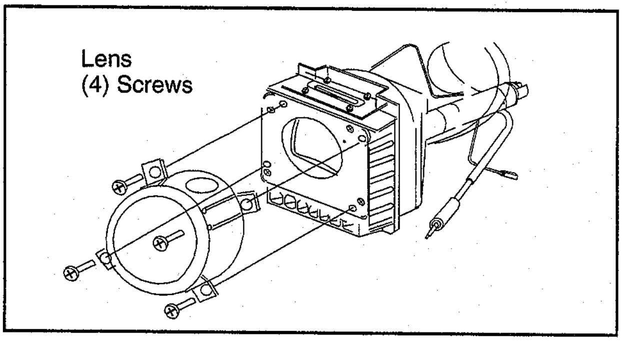


Figure 15. CRT Assembly.

2. Lay CRT face down on a soft cloth.
3. Note position of yoke with centering tabs and remove from defective CRT.
4. Remove CRT Dag ground from defective CRT. Mount it on the replacement CRT exactly as it was on the defective CRT.

***Note:** Replacement CRT comes with H.V. anode lead attached.*

5. Wire the anode lead wire.

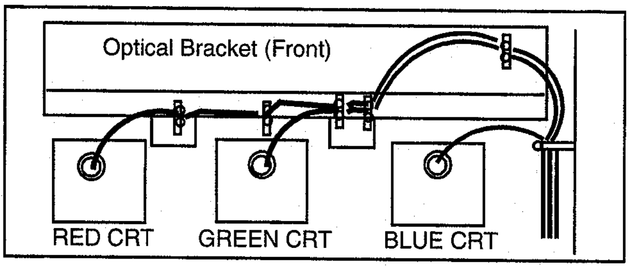


Figure 16. Wire Guide.

6. Install yoke with other CRT neck assemblies on CRT neck in the same order and position as removed from the defective CRT.
7. Press yoke against bell of CRT and tighten the clamp just snug enough so it will not easily shift.
8. Assemble CRT focus lens assembly to new CRT with (4) screws. Make sure focus lens adjustment nut is in the same location as on other CRT focus lens.

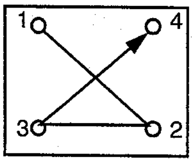


Figure 17. Order of Screws during Assembly.

***Note:** Please assemble with screws in the order shown and tighten with the same torque.*

Optical Block Position Adjustment

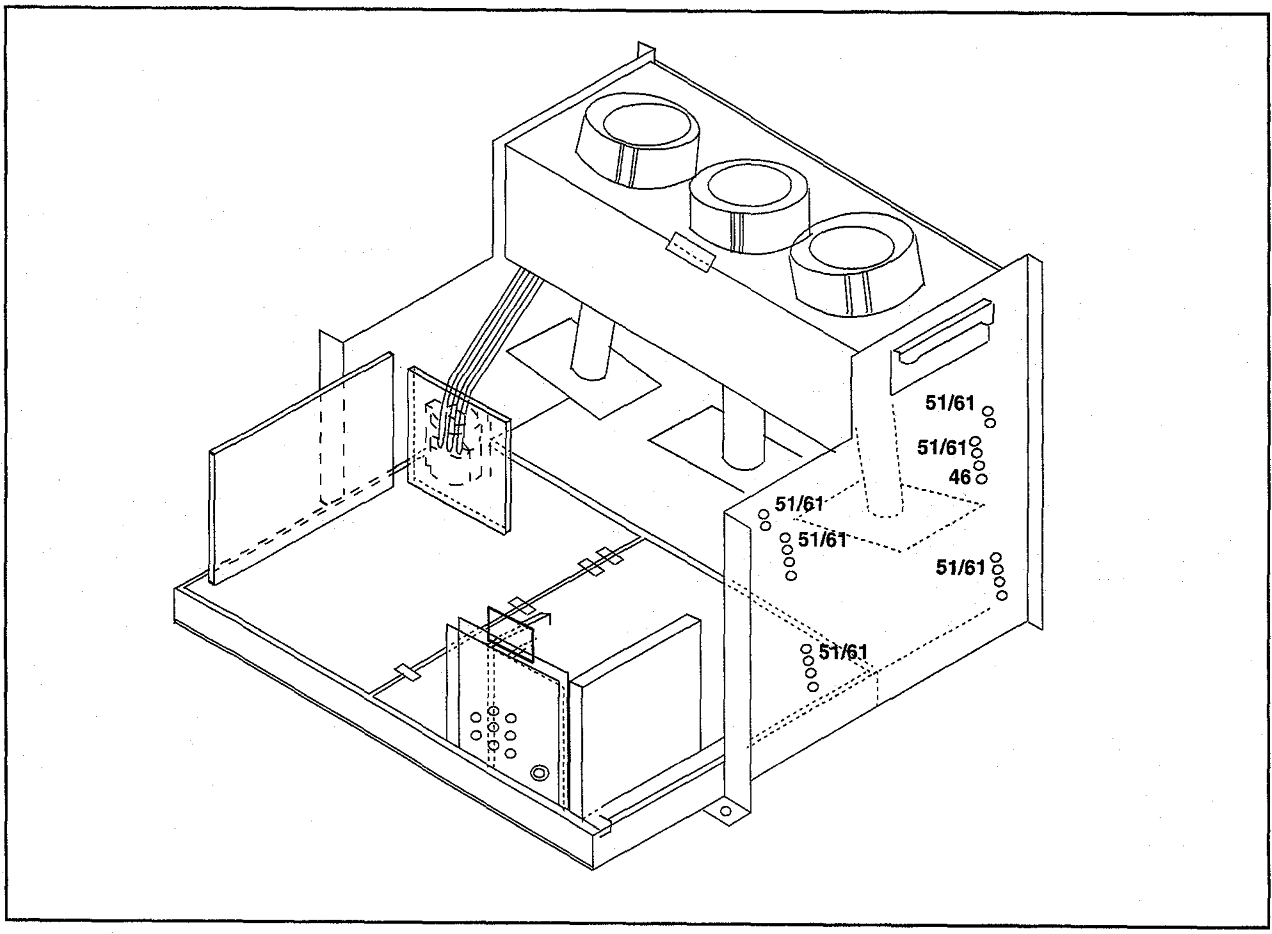


Figure 18. Optical Block Position.

The optical block mounting has holes to allow for the different size projection screens. These mounts will adjust to 61 inch & 51 inch projection screens.

If the optical block is removed for service or is replaced, it is important that the correct mounting holes are used.

PTV SCREEN ASSEMBLIES

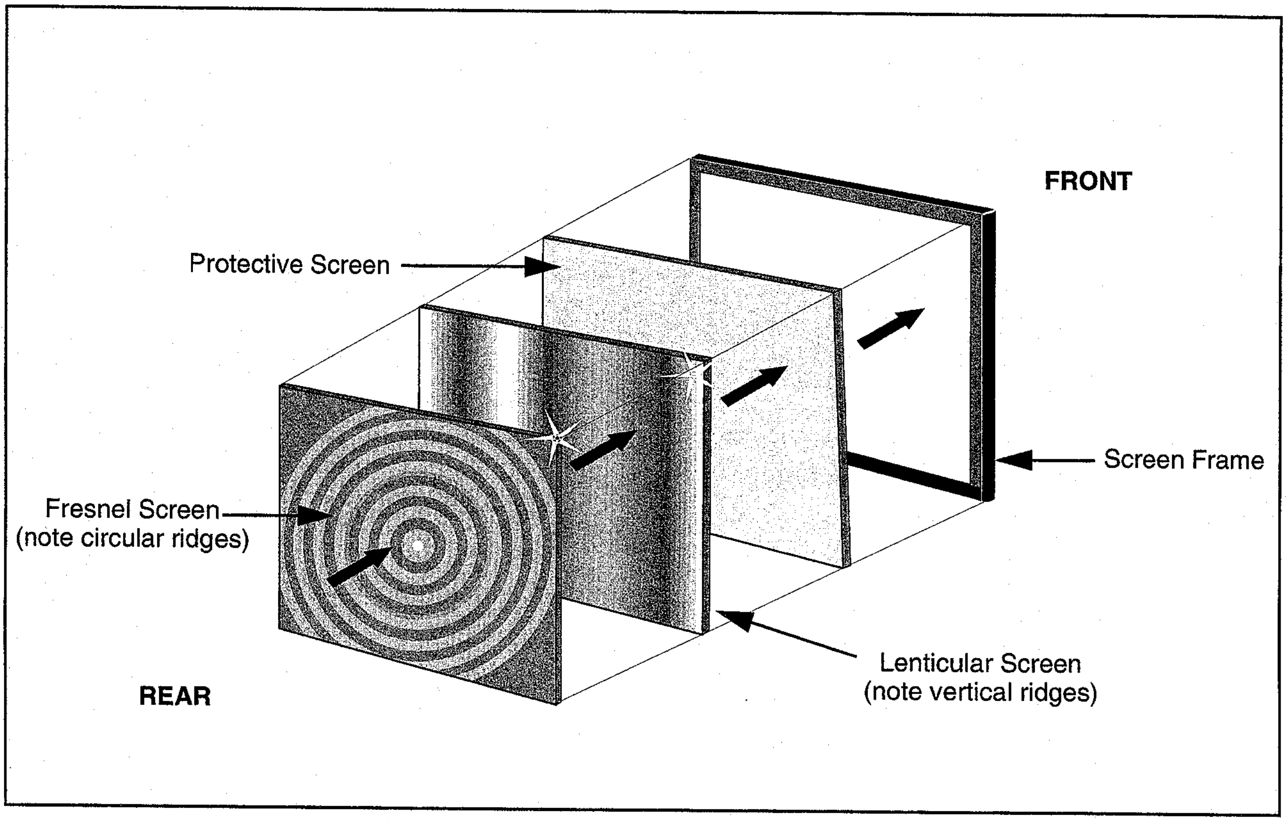

FRONT
Protective Screen
Screen Frame
Fresnel Screen
(note circular ridges)
REAR
Lenticular Screen
(note vertical ridges)

Figure 19. Screen Assemblies.

Note: *The Screen Protector is not used on PT-51G44/C*

IMPORTANT:
For PT-61G54A & PT-61G54CA two matching sets of assemblies for the Fresnel and Lenticular screens are used. The part numbers in each set are:

Set 1 : Fresnel - TKG2AH50181	**Set 2: Fresnel - TKG2AH50231**
Lenticular- TKG2AH50191	**Lenticular- TKG2AH50221**

The screens are not interchangeable. If replacement is required, be sure to replace the screen with an equivalent. The screen part number is imprinted at the bottom corner.

Chassis Boards Layout

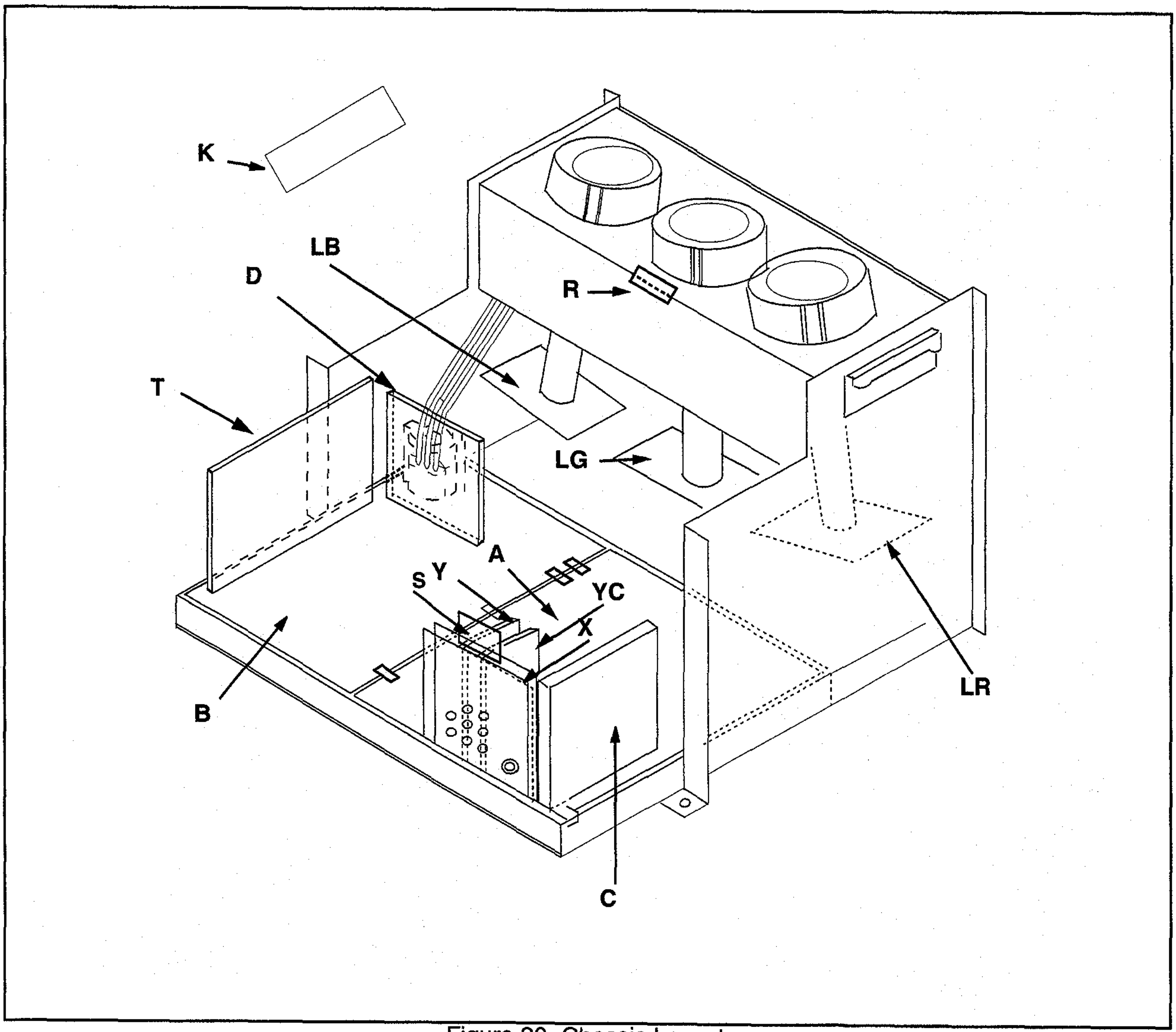
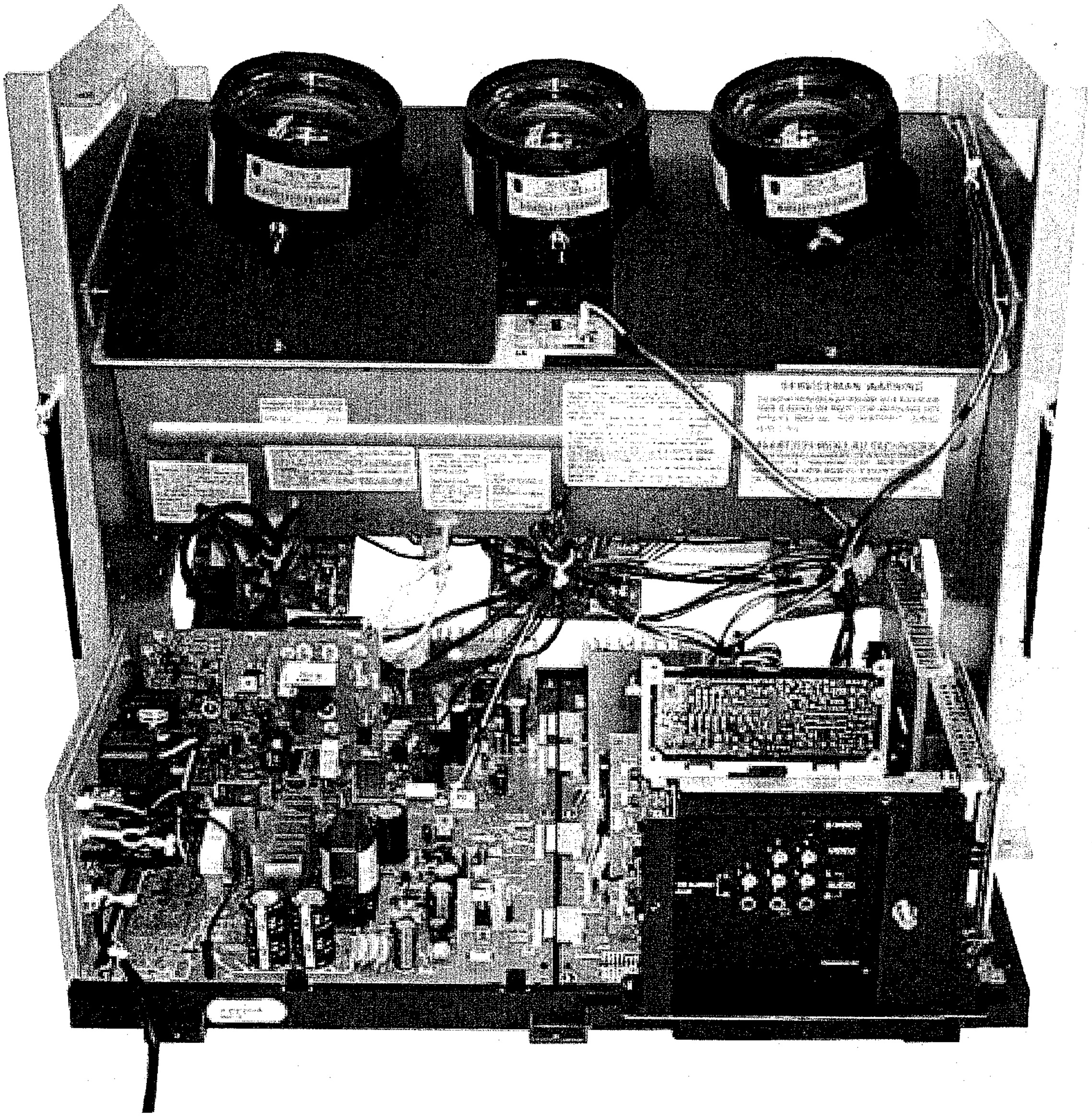


Figure 20. Chassis Layout.

Board	Description
A	Main Chassis - MPU, Audio Amp., Convergence Amp. & Voltage Regulation
B	Switching Power Supply, Horizontal Deflection & High Voltage Protector
C	Digital Convergence
D	EHT protector, over deflection blanking, Vertical stop blanking & Diode Modulation drive
K	Customer Control Keyboard

Board	Description
LB	Blue CRT Output
LG	Green CRT Output
LR	Red CRT Output
R	Remote Control Board
S	Second Tuner
T	Line Filter
X	A/V Terminals, VAO
Y	PIP Processing
YC	3-Line Digital Comb Filter

Chassis View



B+ Voltages Table

Preparation:

1. Set the following controls

   Picture..................................Normal.
   Bright .... Normal.
   Volume.................................Min. (0).
   Digital Conv. Data ....Default Data.

Procedure:

1. Apply a monoscope pattern.
2. Connect the (-) Lead of the Digital Voltmeter to TPBGND (Cold Ground) on B-Board.
3. Connect the (+) Lead of the Digital Voltmeter to Test Point (On B-Board) and confirm the B+ Voltages (See Following Table).

No.	Test Point	Voltage
1	TPB140	139.0±1.0
2	TPB15	15.0±1.0
3	TPB7	7.5±0.5
4	TP23	23.0±1.0
5	TPB23N	-23.5±1.0
6	TPB32	32.0±1.5

Table 2: B+ Voltages Table

CRT Set Up

CAUTION: Insure yoke plugs on the A-Board are reconnected before turning the Receiver ON to prevent damage to the horizontal output transistor and/or CRTs.

1. Connect test generator to the antenna terminal and set for a monoscope pattern.
2. Loosen yoke clamp, seat yoke against bell of CRT and rotate to correct yoke tilt (compare to adjacent CRT). Tighten yoke clamp.
3. Remove adhesive from centering tabs and set centering tabs for zero correction. (Figure 21)

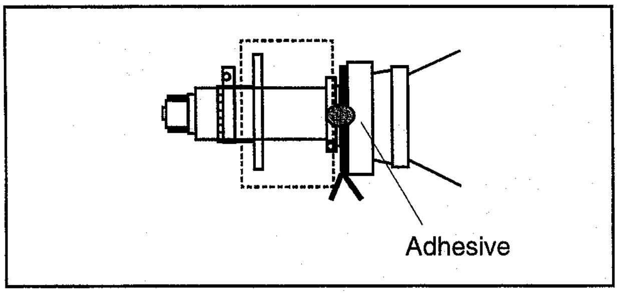


Figure 21. Adhesive Removal

4. Cover replacement CRT lens and static converge the tubes not replaced, if needed. Check size and linearity of pattern and adjust as required.
5. Uncover replacement CRT lens and cover other two CRT lenses. Adjust electrical and optical focus (lens), if required.
6. Uncover all CRT lenses and use yoke centering magnet to converge replacement CRT (in center area of screen only) with other two CRTs. Disregard non-convergence in areas other than center area.
7. Perform White Balance adjustments

Dynamic Focus Adjustment

1. Focus adjustments should be performed after 1 hour of aging.
2. Use oscilloscope with 100: 1 probe.
3. Apply monoscope pattern.
4. Adjust the Red, Blue and Green focus VR on the focus block for best focus of overall picture of each CRT. (Figure 23)

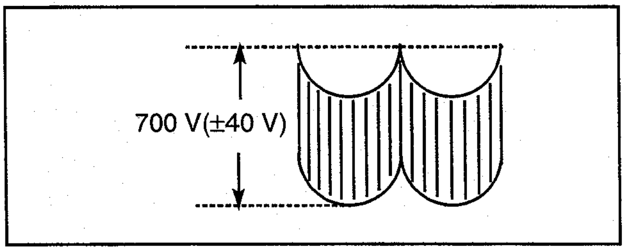


Figure 22. D. Focus Adjustment Waveform

5. Connect the scope probe to TPB20, GND to TPB21. Scope set at 20V/div & 5m sec/dev.
6. Confirm waveform as shown in Figure 22
7. Proceed with Focus Adjustments.

Focus - Electrical Adjustment

1. Cover the Red and Blue CRT, projecting Green only. The electrical focus controls are located on the front. Adjust the Green Focus VR for best focus of overall picture. (Figure 23)

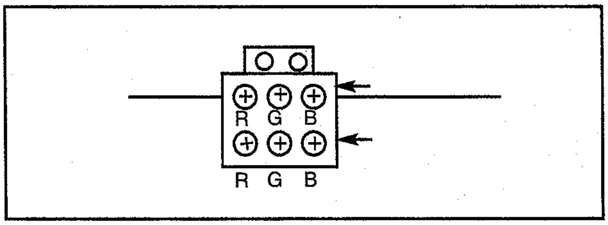


Figure 23. Focus Pack

2. Repeat for Red focus VR while projecting Red only.
3. Repeat for Blue. (Best focus at bottom left corner of screen)

Focus - Optical Lens Adjustment

Note: *This adjustment normally should not require resetting unless the lens has been replaced or adjustment has changed.*

1. Optical focus adjustment is located on the top of each CRT lens system. Loosen the adjustment knurled locking knob. (Figure 24)

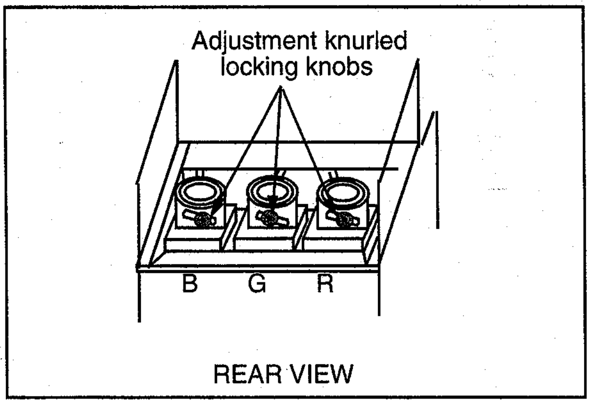


Figure 24. Optical Lens focus Adjustment

2. Turn the Receiver ON. Apply and view a moonscape pattern.
3. Adjust each lens focus for best focus while viewing each CRT.
4. Cover the Red and Blue CRT, projecting green only. Rotate the Green lens for best focus around screen center area.
5. Do the same for the Red focus lens while projecting Red only.
6. Repeat for Blue.

Centering Magnets Adjustment

Horizontal Phase Adjustment

1. Normalize Picture Menu video.
2. Set the receiver to Serviceman Adjustment mode.
3. Apply a monoscope pattern.
4. Cover both red and blue lens so that only the green lens is projecting the monoscope pattern.
5. Adjust H. Size to minimum adjusting DAC V4.
6. Adjust DAC C9 (H. Center) so that the left and right horizontal center line are equal.
7. Use DAC V4 (Horizontal Size) to adjust left and right area to show 5 lines. (Figure 25).

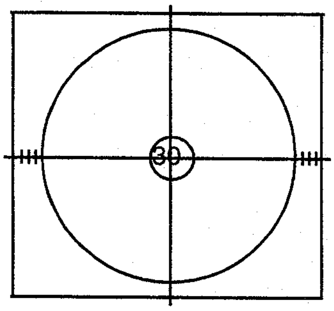


Figure 25. Pattern

Procedures

1. Apply a monoscope pattern.
2. Cover the red and blue lens so only the green lens is projecting the monoscope pattern.
3. In serviceman adjustment mode select DAC:V0 then press "VOL" left or right key to enter the static convergence menu. Adjust all horizontal and vertical RGB data (GV GH, RV, RH, BV, BH to 0).
4. Select DAC V1 and set to 1.
5. Press "0" then "Action" then "5" on remote control.
6. Loosen the deflection coil screw on the Green CRT.
7. Adjust the green pattern to be equal on left and right with the grid horizontal center line. Also adjust for horizontal and vertical tilt.

   ***Note:** Push deflection coil to top of CRT neck, then tighten deflection screw after adjusting each CRT centering and Tilt.*

8. Uncover the red lens and project red only. Repeat steps 5, 6 and 7.
9. Using the red deflection coil, adjust until the red monoscope pattern center is at the appropriate distance as indicated on Figure 26

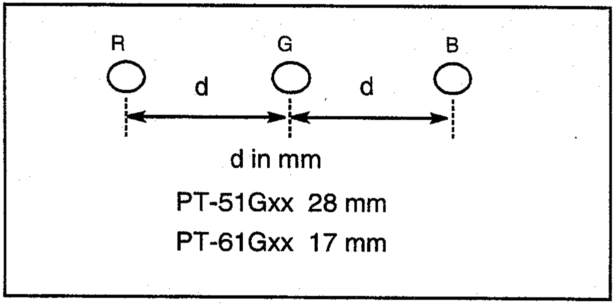


Figure 26. H. Phase Adjustment.

10. Transfer the cap from blue to red, so blue and green are projected.
11. Using the blue deflection coil adjust until the blue pattern center is at the correct distance right from the center of the green cross hatch (Figure 26)
12. Transfer lens cap to project green.
13. Press "TV/Video" on remote control 3 times to display the "OSD Pos ADJ" mode.
14. Adjust the "+" position of OSD to be at the center of pattern by pressing "CH" or "VOL" on remote control.
15. Press "7" then "Action" on remote control.
16. Press "Power" then "Action" on remote control to exit Digital Convergence adjustment mode.
17. Following the adjustment, make sure that all deflection coils are pushed completely toward the CRT cones and that all screws are tightened.

Horizontal Size Adjustment

This is the manual adjustment of horizontal size that is included in the automatic convergence adjustment.

1. Apply a monoscope pattern.
2. Cover both red and blue lens.
3. In serviceman mode, select DAC V1 and press "Volume" key (convergence adjustment mode Turns On).
4. Store current convergence data from template P-1 (working) to template P-2 (storage):
   a. Press the "8" key to enter the copy mode.
   b. Select P-1 with the direction keys.
   c. Press "Action".
   d. Select P-2 using the arrow keys.
   e. Press "Action" to store data.
5. To store the data: Press the "7" key then "Action".
6. To exit convergence adjustment mode: Press "Power" then "Action" .
7. Adjust DAC V4 (H. Size) so that the horizontal size is 5 lines at the right side of the screen.
8. Remove the lens caps from the red and blue lens.
9. To restore original data
   a) Enter the convergence mode again with V1 selection and Volume up key.
   a. Press "8".
   b. Select P-2.
   c. Press "Action".
   d. Select P-1.
   e. Press "Action".
   f. Press "7" and "Action" to save.
   g. Press "Power" and "Action" to exit convergence adjustment mode.

WARNING: To delete all convergence data from memory: Press the "9" key then "Action". Do not perform this operation unless all data is needed to be reentered!

Digital Convergence

The following is a flowchart outlining the procedures for **Digital Convergence.** Use these procedures when replacing the following parts:

- **IC7101** (EEPROM in Digital Convergence Circuit, C-Board)
- any **CRT**
- any **High Voltage Producing Parts**
- any **Part that affects Convergence, when changed**

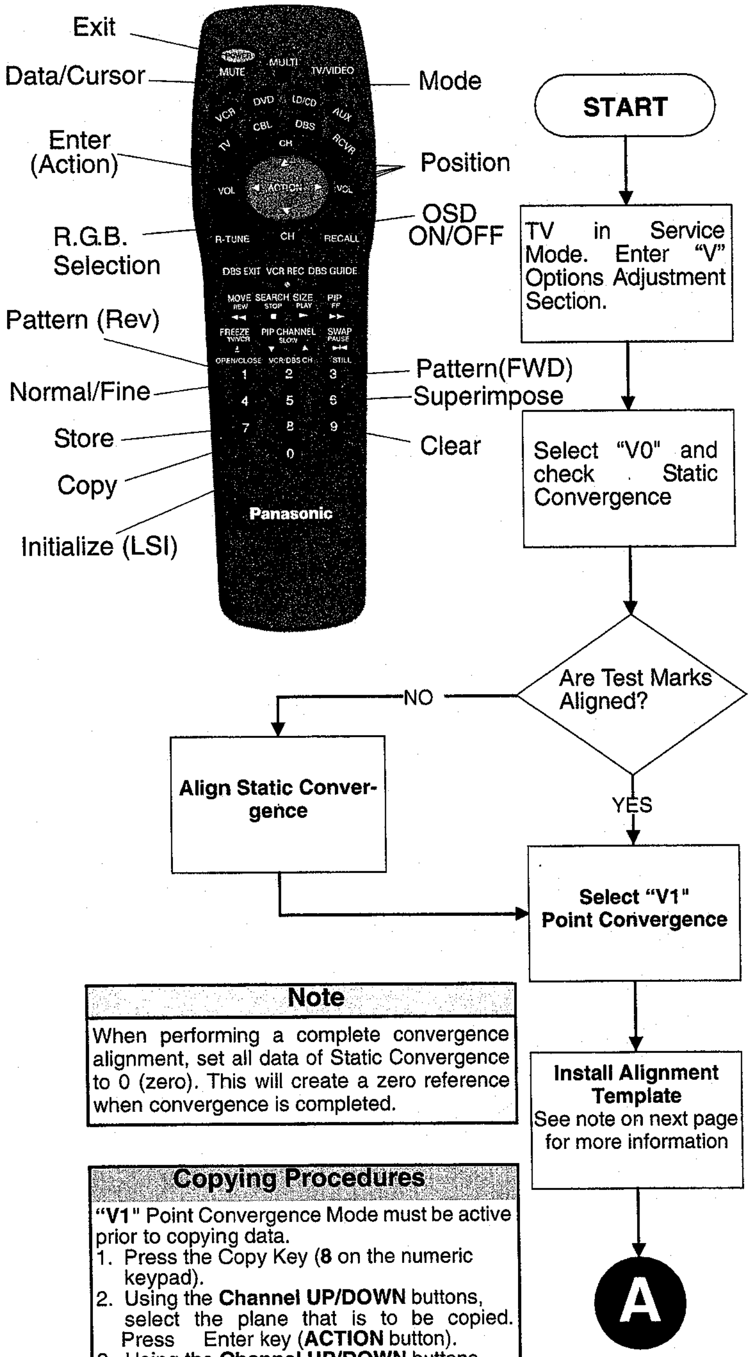
Note

If one or more of the rasters match the grid pattern on the Convergence Alignment Template, the misaligned rasters may be adjusted to merge with the good ones.

Entering Service Mode

1.Select Cable Mode.
2.Set Sleep Timer to 30.
3.Select Channel 124.
4.Press Volume Down on TV.
5.Red "CHK" will appear in top left corner.

•If more than 30 minutes are needed, the Sleep Timer can be disabled after entering Service Mode. Precautions should be observed to avoid damage to CRT's.



TV in Service Mode. Enter "V" Options Adjustment Section.

Select "V0" and check Static Convergence

Are Test Marks Aligned?

Align Static Convergence

Select "V1" Point Convergence

Install Alignment Template
See note on next page for more information

- **Note:** It may be necessary to inject a monoscope pattern into one of the ANT terminals to complete some of the procedures.
  Set TV to view test pattern before proceeding.
- Press **POWER** button on remote to cycle through Adjustment Options.
- Select **"V"** Options.

- If necessary, press **Channel UP/DOWN** on remote until **"V0"** is displayed.
- Press **Volume LEFT/RIGHT** on remote to enter "V0" **Static Convergence Mode.**

Static Convergence

1. Using the Channel UP/DOWN and Volume LEFT/RIGHT buttons, align the Green Horizontal and Vertical test marks with the Screen Frame mechanical reference marks.
2. Press ACTION button to cycle through options and exit Static Convergence Mode.

- Press **Channel UP/DOWN** on remote until **"V1"** is displayed.
- Press **Volume LEFT/RIGHT** on remote to enter "V1" **Point Convergence Mode.**

Note

When performing a complete convergence alignment, set all data of Static Convergence to 0 (zero). This will create a zero reference when convergence is completed.

Copying Procedures

"V1" Point Convergence Mode must be active prior to copying data.

1. Press the Copy Key (**8** on the numeric keypad).
2. Using the **Channel UP/DOWN** buttons, select the plane that is to be copied. Press Enter key (**ACTION** button).
3. Using the **Channel UP/DOWN** buttons, select the destination plane. Press Enter key (**ACTION** button).

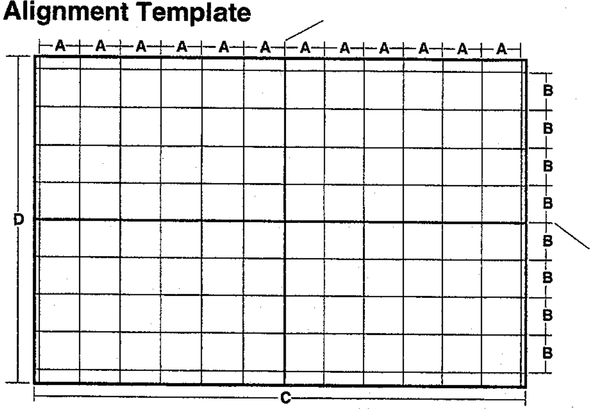
Helpful Hint

There are three "planes" or storage areas available when adjusting convergence: the Factory Default Plane (FACT), the Actual Plane (P-1), and the Test or Temporary Plane (P-2). **FACT** is the plane that contains the factory baseline and is **only used at the factory. P-1** is the plane that is always active. **P-2** is a storage bin that can be used to store data safely while P-1 is being adjusted. To copy data between the different planes proceed with the steps outlined in the **Copying Procedures.** It is advisable to copy good data from P-1 to P-2 at the start and occasionally during convergence, just in case P-1 gets corrupted during adjustment. Then P-2 can be copied into P-1 and alignment can continue with the uncorrupted data that was last stored.

Digital Convergence (cont.)

Convergence Alignment Template (for P3)

Alignment Template



Block Dimensions
For 51" Models only
A = 85.5 mm
B = 93 mm
C = 1040 mm
D = 740 mm

Block Dimensions
For 61" Models only
A = 102.8 mm
B = 111.2 mm
C = 1234 mm
D= 890 mm

Align the Template's Horizontal and Vertical center lines with the TV's Mechanical Test Marks.

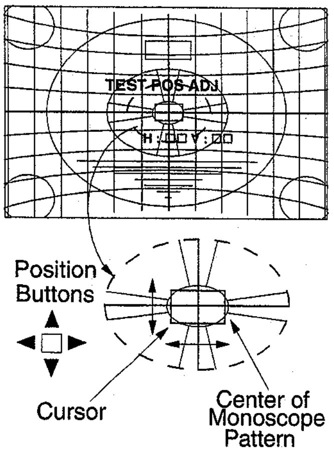
The **Convergence Alignment Template** is a grid approximately the size of the viewing screen used to ensure the proper size and shape of the alignment rasters. It is 12 blocks across by 8 blocks high. The grid dimensions will vary according to the size of the screen.

Apply a Convergence Alignment Template to the viewing screen of the TV. Make sure the center lines are properly aligned. If a template is not available, one can be created by following the instructions below.

Create a Convergence Alignment Template by drawing the pattern to the right in the actual dimensions on transparent film or tracing paper. Start with the Horizontal and Vertical Center Axis and work outwards until the pattern is complete. Pay close attention to the actual dimensions of the pattern.

A Convergence Alignment Template, Part No. TQD2AA19013, is available through Matsushita/Panasonic Services

A



Enter "TEST POS ADJ"

- Press Initialize (LSI) key (**0** button on remote) to enter **"TEST POS ADJ"** (Test Pattern Phase Adjustment).
- Press Enter Key (**ACTION** button on remote).

Adjust the cursor over the center of a monoscope pattern

- Press the Superimpose key (**5** on the remote) to view the injected monoscope pattern.
- Using the Position Keys (**Channel UP/DOWN** and **Volume LEFT/RIGHT**), center the cursor over the center of the monoscope pattern.

Enter "DATA PHASE ADJ"

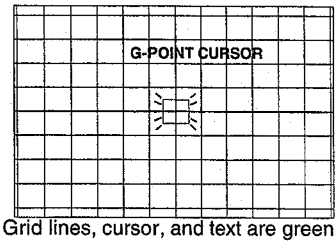
- Press the Superimpose key (**5** on the remote) to stop displaying the monoscope pattern.
- Press Mode key (**TV/VIDEO** button on remote) to cycle through adjustment modes.
- Select **"DATA PHASE ADJ"** mode

Adjust the Height Rise Point

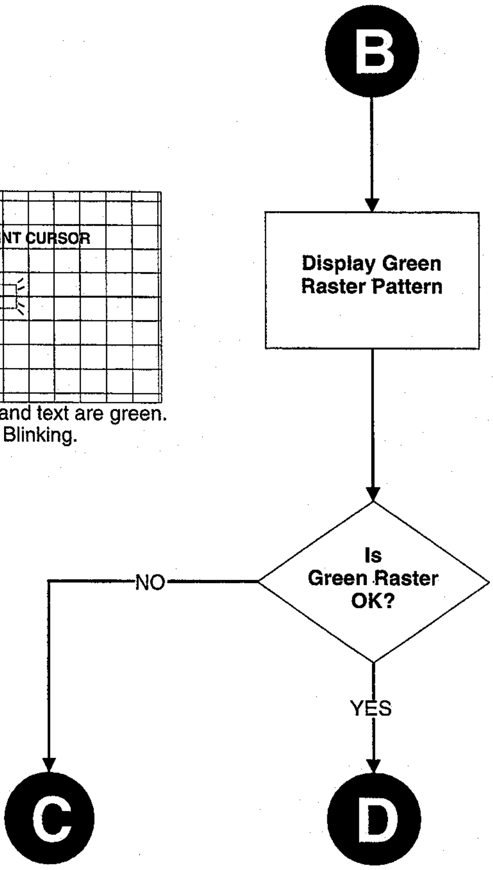
- Using the **Volume LEFT/RIGHT** buttons on remote, position the **Height Rise Point** of the screen center line to the middle of the cursor.
- Press Initialize (LSI) key (**0** button on remote) to exit.

B

Digital Convergence (cont.)


G-POINT CURSOR

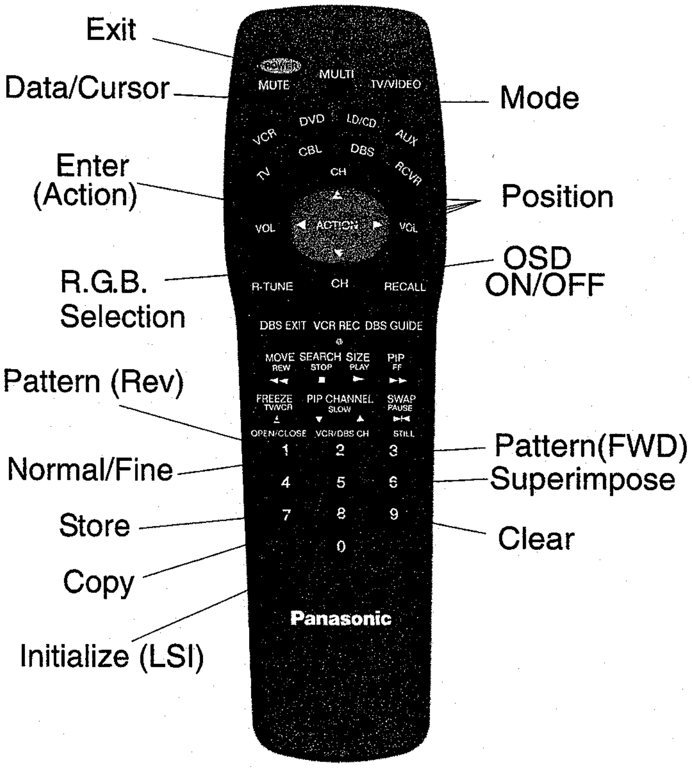
Grid lines, cursor, and text are green.
Cursor is Blinking.


B
Display Green Raster Pattern
Is Green Raster OK?
NO
YES
C
D

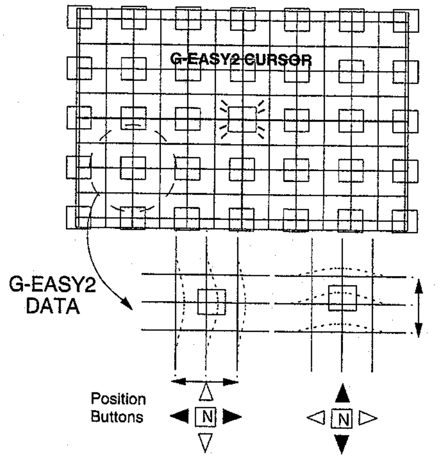
- Press Pattern Keys (**1** or **3** on remote) to cycle through raster patterns (White, Green, Red, Yellow, Blue, and Cyan).
- Stop when the Green raster pattern is displayed.

Helpful Hint

Using **EASY2** straighten lines first. Then adjust for good linearity. If any unique distortion is still visible, use **Point Convergence** to correct raster.

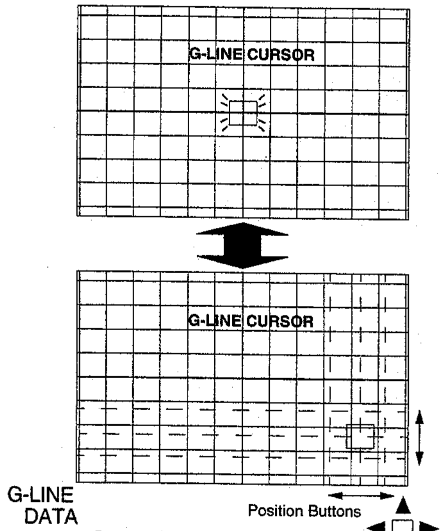

Exit
Data/Cursor
Enter (Action)
R.G.B. Selection
Pattern (Rev)
Normal/Fine
Store
Copy
Initialize (LSI)
Mode
Position
OSD ON/OFF
Pattern(FWD)
Superimpose
Clear
Panasonic

Digital Convergence (cont.)



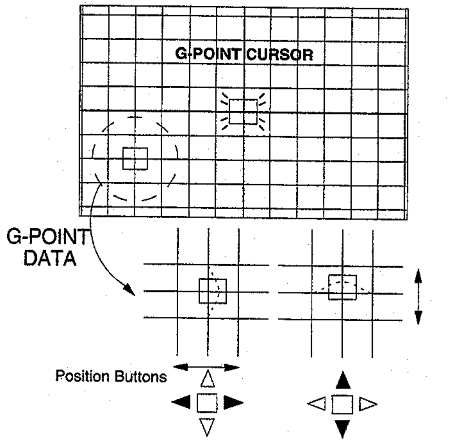
G-EASY2 CURSOR
G-EASY2 DATA
Position Buttons
N
N

- - - - Green Crosshatch patter
——— Convergence Adj. panel lines
(Adjust points = 35 points)



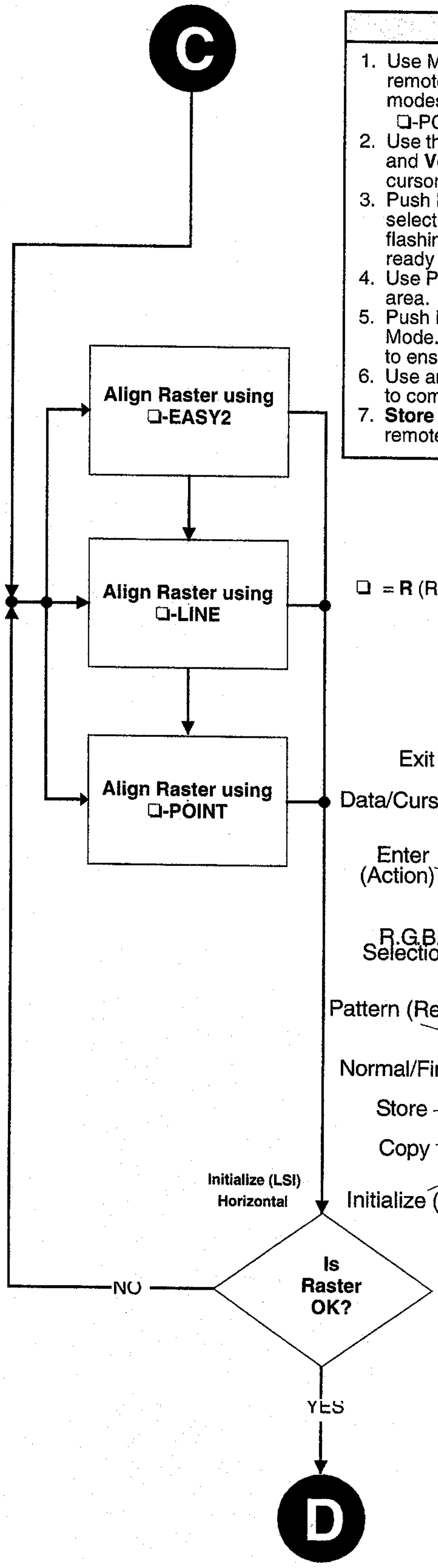
G-LINE CURSOR
G-LINE CURSOR
G-LINE DATA
Position Buttons

- - - Green Crosshatch patter
——— Convergence Adj.panel lines
(Adj. points = All cross points)



G-POINT CURSOR
G-POINT DATA
Position Buttons

- - - - Green Crosshatch patter
——— Convergence Adj. panel lines
(Adj. points = All cross points)

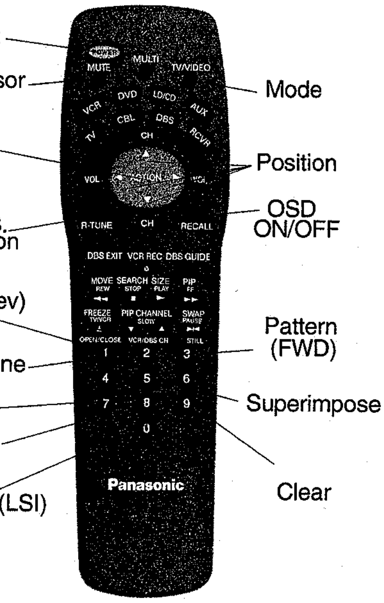


C
Align Raster using ❑-EASY2
Align Raster using ❑-LINE
Align Raster using ❑-POINT
Initialize (LSI) Horizontal
NO
Is Raster OK?
YES
D

Point Convergence

1. Use Mode Key (**TV/VIDEO** button on remote) to cycle through adjustment modes: ❑-LINE, , ❑-EASY2,❑-PERI-, ❑-POINT.
2. Use the Position Keys (**Channel UP/DOWN** and **Volume LEFT/RIGHT**) to move the cursor to the desired area.
3. Push Data/Cursor Key (**Mute** button) to select Data Mode. The cursor will stop flashing. This indicates that the system is ready to adjust.
4. Use Position Keys to adjust the selected area.
5. Push Data/Cursor key to select Cursor Mode. Repeat steps 2 through 5 as needed to ensure good shape and linearity.
6. Use any combination of adjustment modes to complete convergence.
7. **Store Data often**, using the Store Key (**7** on remote) and Enter Key (**ACTION** button).

❑ = **R** (RED), **G** (GREEN),or **B** (BLUE).

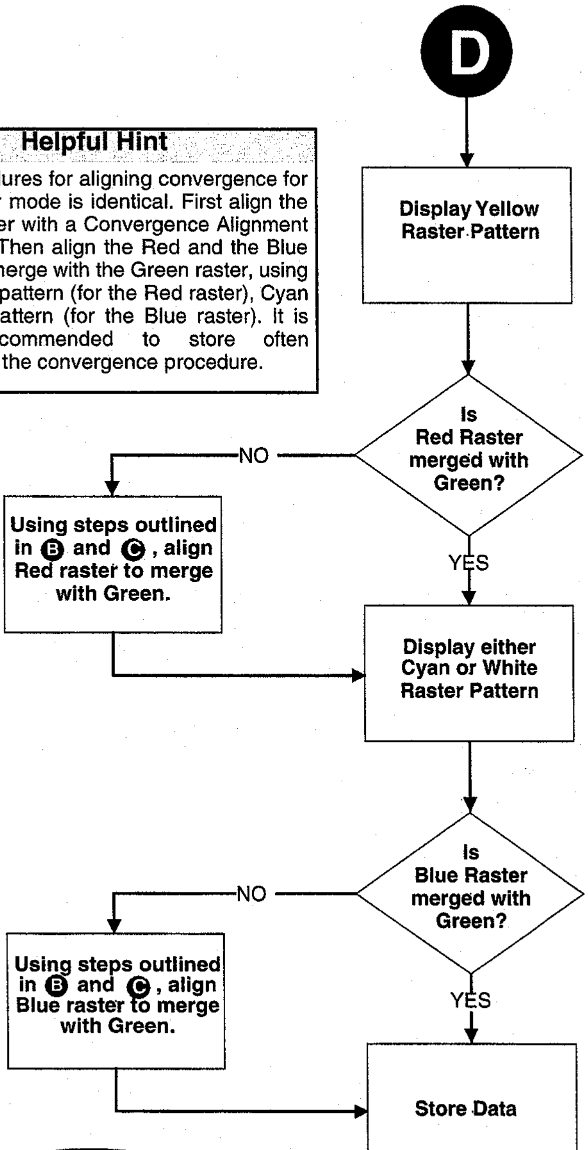


Exit
Data/Cursor
Enter (Action)
R.G.B. Selection
Pattern (Rev)
Normal/Fine
Store
Copy
Initialize (LSI)
Mode
Position
OSD ON/OFF
Pattern (FWD)
Superimpose
Clear
MUTE
MULTI
TV/VIDEO
VCR
DVD
LD/CD
AUX
CBL
DBS
RCVR
TV
CH
VOL
ACTION
VOL
R-TUNE
CH
RECALL
DBS EXIT
VCR REC
DBS GUIDE
MOVE
SEARCH
SIZE
PIP
FREEZE
PIP CHANNEL
SWAP
1
2
3
4
5
6
7
8
9
0
Panasonic

Digital Convergence (cont.)

Helpful Hint

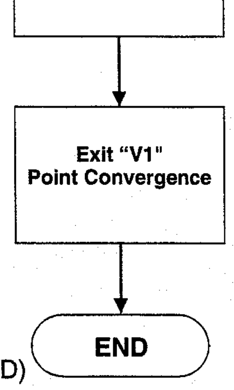
The procedures for aligning convergence for each raster mode is identical. First align the Green raster with a Convergence Alignment Template. Then align the Red and the Blue rasters to merge with the Green raster, using the Yellow pattern (for the Red raster), Cyan or White pattern (for the Blue raster). It is highly recommended to store often throughout the convergence procedure.


D
Display Yellow Raster Pattern
Is Red Raster merged with Green?
NO
Using steps outlined in B and C, align Red raster to merge with Green.
YES
Display either Cyan or White Raster Pattern
Is Blue Raster merged with Green?
NO
Using steps outlined in B and C, align Blue raster to merge with Green.
YES
Store Data

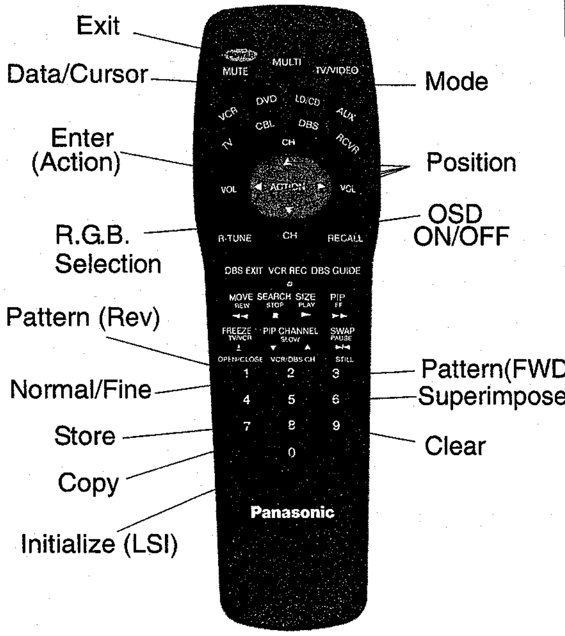
- Press Pattern Keys (**1** or **3** on remote) as needed to display **Yellow (Red + Green)** raster pattern.

- Press Pattern Keys (**1** or **3** on remote) as needed to display either the **Cyan (Blue + Green)** or the **White (Red + Green + Blue)** raster pattern.

- Press Store Key (**7** button on remote) to save data in P-1.
- Press Enter Key (**ACTION** button on remote)


Exit "V1" Point Convergence
END

- Press Exit Key (**POWER** button on remote)
- Press Enter Key (**ACTION** button on remote)


Exit
Data/Cursor
Enter (Action)
R.G.B. Selection
Pattern (Rev)
Normal/Fine
Store
Copy
Initialize (LSI)
Mode
Position
OSD ON/OFF
Pattern(FWD)
Superimpose
Clear
Panasonic

Reminder

When completed, if no other alignments are necessary, **exit the Service Mode**.
- Press and hold **ACTION** and **POWER** buttons together until the screen blanks.
- The TV should reset itself and turn itself back on in a few seconds.
- Adjust TV for normal viewing.

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I^{2}C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using "On Screen Display Menu". (The **Serviceman Adjustment Mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the* ***Serviceman Adjustment Mode****; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Quick Entry to Serviceman Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press ACTION button twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press the VOL ◀ button (decrease) **on Receiver**. Red "CHK" appears in upper corner

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing the Action and the Volume Up buttons on the Receiver simultaneously will toggle between the modes. Red "CHK" for Serviceman and yellow "CHK" for Aging.

7. **Press** the **Power** Button on the **Remote Control** to select one of six Serviceman Adjustment Modes.
    1) **B**= Serviceman VCJ SUB-DATA ADJUSTEMENT.
    2) **C**= Serviceman VCJ CUT-OFF ADJUSTMENT.
    3) **S**= Serviceman OPTIONS (PIP and CLOCK) ADJUSTMENT.
    4) **M**= Serviceman MTS ADJUSTMENTS.
    5) **V** = Serviceman OPTIONAL ADJUSTMENT.
    6) "**CHK**" = Normal operation of CHANNEL ▲▼ and VOLUME ◀ ▶.

Note: *Only the applicable settings for the Receiver serviced will be available (See* ***a*** *in Figure 27).*

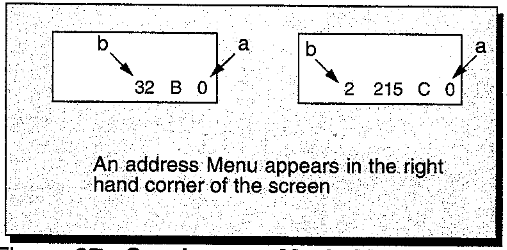

b
a
32 B 0
b
a
2 215 C 0
An address Menu appears in the right hand corner of the screen

Figure 27. **Serviceman Mode Menu Adjustments.**

Exiting the Serviceman Mode:

Press the **Action** and the **Power** buttons on the **Receiver** simultaneously for at least 2 seconds.

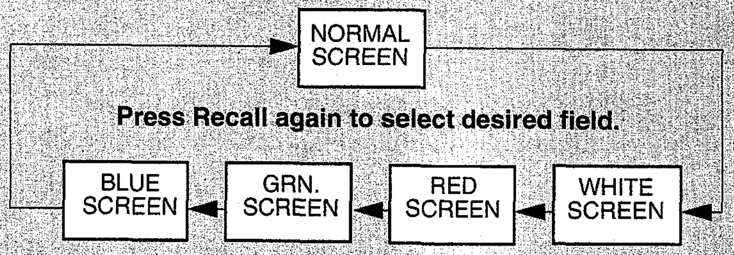
THE RECEIVER EXITS SERVICEMAN MODE.

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound. Any programmed channels, channels caption data and some others user defined settings will be erased.

IMPORTANT NOTE:
Always Exit the Serviceman Mode
Following Adjustments.

To Check Purity:

Press the **Recall** Button on the **Remote Control** when in Serviceman Mode (red "CHK" is displayed) to enter the Purity Field Check Mode.


NORMAL SCREEN
BLUE SCREEN
GRN. SCREEN
RED SCREEN
WHITE SCREEN

Press Recall again to select desired field.

Figure 28. **Purity Check Field Mode.**

Serviceman Mode (Electronic Controls, Cont.)

Important Note:
Write down the original values ("b" in the adjustment mode details, Figure 27) for each address adjustment before modifying values.

Serviceman Sub Adjustments

a. Press

CH ▲▼ buttons on the Remote Control to select any of the 6 Service Sub Adjustment Addresses. ("a" in Figure 27)

b. Press

The ◀ ▶ buttons on the Remote Control to adjust the level of the selected Service Adjustment.

Service Adjustment	Adj. Range	Default Level
B0 Sub Color	0 ~ 63	27
B1 Sub Tint	0 ~ 63	50
B2 Sub Brightness	0 ~ 255	50
B3 Sub Contrast	0 ~ 63	25
B4 Sub ETC1	0 ~ 7	5
B5 Video Adjust	0 ~ 15	8
B6 Audio Adjust	0 ~ 31	23

Serviceman VCJ Cut-Off Adjustments

a. Press

CH ▲▼ buttons on the Remote Control to select any of the Service VCJ Cut-Off Adjustment Addresses. ("a" in Figure 27)

b. Press

The ◀ ▶ buttons on the Remote Control to adjust the level of the selected Service Adjustment.

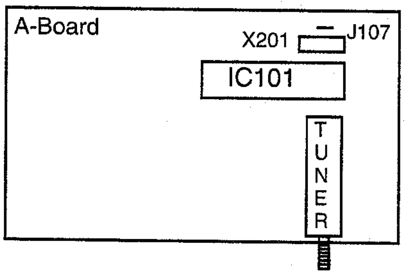
Service Adjustment	Adj. Range	Default Level
C0 RED Cutoff (Low Light)	0~1 0 ~ 255	0 0 ~ 150
C1 GRN Cutoff (Low Light)	0 ~ 255	74
C2 BLU Cutoff (Low Light)	0~1 0 ~ 255	0 78
C3 Red Drive	0 ~ 127	32
C4 BLU Drive	0 ~ 127	43
C5 YNR Switch	0 ~ 1	0
C6 AFT	0~1 0 ~ 255	1 122
C7 RF-AGC	0 ~ 127	64
C8 YNR	0 ~ 7	14
C9 Horizontal-center	0 ~ 31	14
CA Beam limit	0 ~ 7	5
CB Y delay	0 ~ 2	0
CC B.P.F. Switch	0 ~ 1	1

Serviceman MTS Adjustments

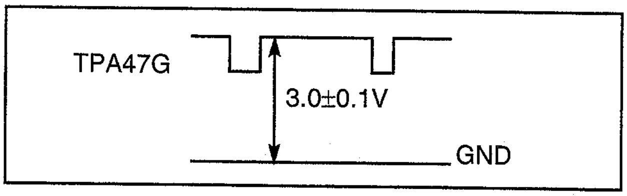
Service Adjustment	Adj. Range	Def. Level
M0 MTS input level	0 ~ 63	35
M1 MTS stereo PLL/VCO	0 ~ 63	34
M2 MTS filter	0 ~ 63	27
M3 MTS low level separation	0 ~ 63	37
M4 MTS high level separation	0 ~ 63	23

Sub-Brightness Adjustment

1. This adjustment will require a jumper from TP22 (J107) to ground.

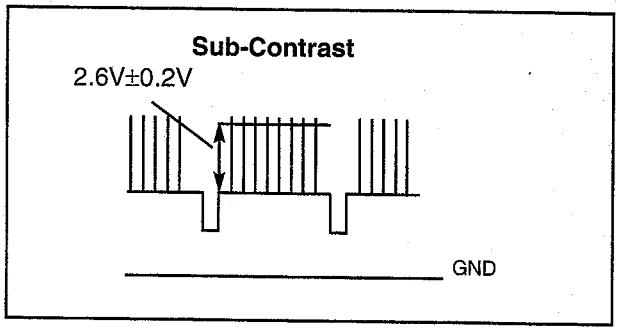


2. Use the one line convergence pattern from the NTSC generator.
3. Set C0 : 0_128, C1 : 100 and C2 : 0_128.
4. Place the scope probe on test point TPA47G (video).
5. Adjust B2 for 3 volts from ground to black level



Sub-Contrast Adjustment

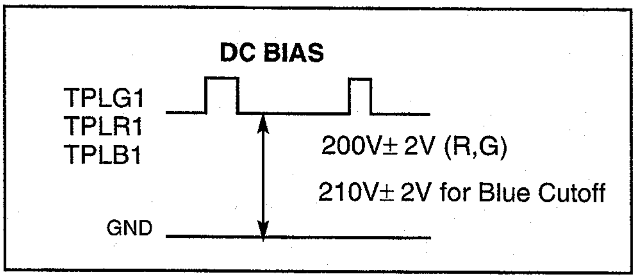
1. Apply a cross hatch pattern from the NTSC generator.
2. Confirm that C0 and C2 are 0_128.
3. Connect the scope probe to test point TPA47G.
4. Adjust DAC B3 for 2.6 volts from the horizontal line to black.



Serviceman Mode (Electronic Controls, Cont.)

CRT DC Bias

1. Use the one line convergence pattern from the NTSC generator.
2. Check the green and red cathode voltages at TPLG1 & TPLR1 for 200 volts from ground to black
3. Check the blue cathode voltage at TPLB1 for 210 volts from ground to black.



Red, Green & Blue Screen Cutoff

1. Use either a no input signal condition or raster from the NTSC generator.
2. Observing the green tube directly or via a reflective surface, adjust the VR on the green tube for minimum noise.
3. Adjust the noise level in the red and blue tubes to match the noise level in the green tube.

Service Adjustment	Adj Range	Default Level
S0 = PIP color	0~127	125
S1 = PIP contrast	0~127	37
S2 =Upper (1/9)	0~255	25
S3 = Lower (1/9)	0~255	149
S4 = Left (1/9)	0~255	7
S5 = Right (1/9)	0~255	107
S6 = Upper (1/16)	0~255	25
S7 = Lower (1/16)	0~255	165
S8 = Left (1/16)	0~255	7
S9 = Right (1/16)	0~255	124
SA = (Not Applicable)	-	-
SB = Clock adjust	0~255	161
SC = PIP tint	0~63	50
SD = Loudness Comp.	0~63	52

Service Adjustment	Adj Range	Default Level
V0 = Static Digital convergence	-	-
V1 = Dynamic Digital convergence	0~99	0
V2 = Blue gamma	0~255	15
V3 = Vertical size	0~255	89
V4 = Horizontal size	0~255	95
V5 = Sub sharpness	0~99	33

White Balance Adjustment

This adjustment requires that the serviceman use skills in observing what a screen without color should look like.

1. Enter the serviceman mode.
2. Apply a monoscope pattern to one of the video inputs.

High Light White Balance Adjustment

1. Adjust DAC C3 for Red and C4 for Blue adjustments.
2. Make sure the screen is not blue or red. The screen should be white in all areas.
3. Check the monoscope pattern for a black and white picture with even shades of gray and no color tint in the picture.

Low Light White Balance Adjustment

1. Adjust DAC C0 for red and DAC C2 for blue.
2. Check the screen for even white in all areas, no color.
3. Check the monoscope pattern for a black and white picture, even shades of gray and no color tint in the low light areas.
4. Repeat the High Light and Low Light White Balance again until the white balance tracks from high light to low light.

Tint and Color Check

Again, the serviceman ability to see color and the balance of color is important for theses adjustments.

Tint Check

1. In Picture Menu set Picture Norm to YES.
2. Apply color bars to the video input.
3. Magenta is composed of two colors, blue and red.
4. Check to see that magenta does not have too much blue or too much red.
5. Check Cyan. Cyan is composed of blue and green. It should not have too much blue or green.
6. Use a test signal from a VCR or laser disk that has a pre-recorded close up of a signal that has good flesh tones.
7. The signal on the VCR or laser disk should look normal.

Color Check

Using a clean RF or video signal, set the color level so that it does not saturate or appear harsh. Make sure that color is not set so that it appears dull and washed out. Look for natural colors, try to adjust the picture to appear as a normal photograph.

Serviceman Mode (Electronic Controls, Cont.)

Audio Adjustment

Serviceman DAC Adjustment (B6)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

Preparation:

1. Apply the following signal at the antenna (70dB ±5dB, 75Ω open P/S 10dB): audio signal set to monaural, 300Hz. 100% modulation; video input of 100 IRE flat field, 30% modulation.
2. Connect the RMS Meter with filter jig as shown in Figure 29.

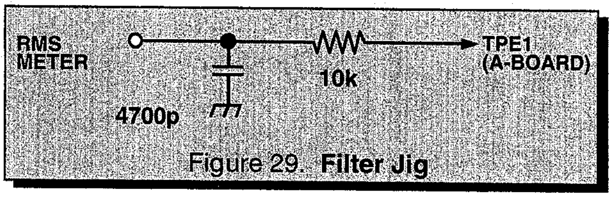


Figure 29. **Filter Jig**

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select the Audio Adjustment DAC (B6) and adjust until 150mV RMS ± 7.5mV RMS is measured.
2. EXIT the Serviceman Adjustment Mode.

MTS Circuit Adjustments

Note: *It is important to adjust the MTS circuit in the order shown below.*

The MTS Circuit Adjustments require four steps:

1. Stereo VCO Adjustment.
2. Filter Adjustment.
3. Input Level Adjustment.
4. Stereo Separation Adjustment.

Stereo VCO Adjustment (M1)

Preparation:

1. Connect a 1KΩ resistor between TP14 and TPA14(GND)
2. Connect a 22µf, 16V Capacitor between TPE1 ("+" Pin of Cap.) and TPA13 GND (Pin "-" of Cap.)
3. Connect a frequency counter as follows: Positive lead (+) to TPE10 (R-Out), negative lead (-) to TPA13 (GND).

Note: *15 seconds aging is required prior to performing the following procedure.*

Procedure:

Adjust (M1) *MTS-VCO* data (in the Serviceman Adjustment Menu) until the frequency counter measures 15.734kHz ± 50Hz.

Filter Adjustment (M2)

Preparation:

1. Connect a signal generator (sine wave) to antenna.
2. Connect a DVM (AC Range) as follows: Positive lead (+) to TPE1 and negative lead (-) to GND.
3. Connect a scope as follows: Positive lead (+) to TPE11, negative lead (-) to TPA13(GND).

Procedure:

1. Apply the following signal from the signal generator:
   Field strength: 70 ± 5dB, 75Ω OPEN, P/S 10dB
   Video: 100 IRE flat field, 30% modulation.
   Audio: 15.734kHz sine wave.
2. Adjust sine wave signal generator output level (15.734KHz) to obtain 100mV± 5mVrms at TPE1.
3. Adjust MTS filter (M2) data (in the Serviceman Adjustment Menu) until the amplitude of the measured waveform on the oscilloscope is minimum.

Input Level Adjustment (M0)

Preparation:

1. Connect an RMS meter (AC Range) with filter jig as shown in Figure 30.

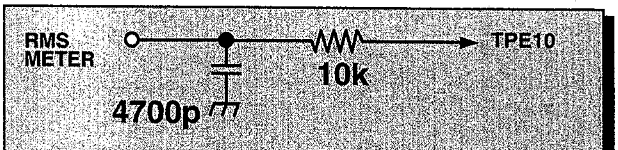


Figure 30. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural (70 ± 5dB, 75Ω OPEN, P/S 10dB)
2. Adjust M0 data in the Serviceman Adjustment Menu) until the voltage measured is 190mV ± 10.0mV rms.

Serviceman Mode (Electronic Controls, Cont.)

Stereo Separation Adjustment (M3 & M4)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect an oscilloscope probe to TPE10 and GND wire to TPA13 (GND).

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 30% modulation, stereo (left only) (70dB ± 5dB, 75Ω OPEN).
   ***Note:** Set Audio mode to **Stereo**.*
2. Adjust M3 (MTS Low-Level Separation) data (in the Serviceman Adjustment Menu) until the amplitude of the measured waveform on the scope is minimum.
3. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 3KHz, 30% modulation, stereo (left only). (70dB ± 5dB, 75Ω OPEN, P/S 10dB).
4. Adjust M4 (MTS High-Level Separation) data (in the Serviceman Adjustment Menu) until the amplitude of the waveform measured on the scope is minimum.
5. Repeat above steps 2 through 4 until the amplitude is at minimum for both signals.

Serviceman Mode (Mechanical Controls)

2nd Tuner - VCO Adjustment, Mechanical (S-Board)

Note: *Allow 20 seconds of aging prior to making the flowing adjustments.*

Preparation:

1. Apply color bars to the video input.
2. Connect an oscilloscope to TP12 (on S-Board). Use cold ground for scope connection. Set the scope at Horizontal Sweep rate (20µs) time base.
3. Connect a DVM to TP10 (on S-Board).
4. Connect a jumper between TPA7 and TPA13 (GND) on the A-Board.

Procedure:

1. Adjust L2109 (on S-Board) to measure 2.4V± 0.1V on the DVM. Confirm that the scope reading is within 1.0 ± 0.25V_{P-P} from sync tip to white level. See Figure 31

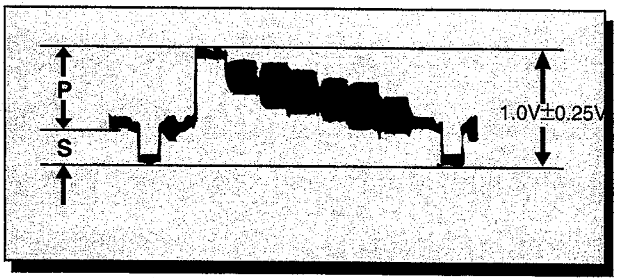


Figure 31. TP12 Waveform

2. Check that the sync signal amplitude (ratio between the sync signal to detection output) is within the range of 30 ±5% (S/(S+P) = 30 ±5%).

2nd Tuner - RF-AGC Adjustment, Mechanical (S-Board)

Preparation:

1. Connect a DVM to 2nd tuner AGC terminal.
2. Apply color bar with 63±2dB (75Ω open).

Procedure:

1. Rotate R2118 (on S-Board) fully clockwise and confirm that noise disappears. Record the reference voltage.
2. Rotate R2118 fully counter-clockwise and confirm that noise appears.
3. Slowly turn R2118 clockwise until the reference voltage is obtained.
4. Confirm RF-AGC voltage (the reference voltage) is lower when the incoming field signal strength is increased by 3dB.

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CR2801	**EXNG131P365**	**RES-CAP 130PF/3.6 MEG**
CR2802	**EXNG131P365**	**RES-CAP 130PF/3.6 MEG**
		CAPACITORS
C004	ECA1HM010	CAP,E 1.0UF/50V
C006	ECUX1H331KBX	CAP,C 330PF-K-50V
C008	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C009	ECA1CM101	CAP,E 100UF/16V
C010	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C013	ECA1CM101	CAP,E 100UF/16V
C014	ECUX1H221KBX	CAP,C 220PF-K-50V
C017	ECUX1H330JCX	CAP,C 33PF-J-50V
C018	ECUX1H330JCX	CAP,C 33PF-J-50V
C019	ECA1CM101	CAP,E 100UF/16V
C020	ECA0JM331	CAP,E 330UF/6.3V
C021	ECUX1H392KBX	CAP,C .0039UF-K-50V
C022	ECA1CM471	CAP,E 470UF/16V
C023	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C026	ECA1CM102	CAP,E 1000UF/16V
C027	ECA1CM221	CAP,E 220UF/16V
C028	ECA1HM010	CAP,E 1.0UF/50V
C033	ECA1VM470	CAP,E 47UF/35V
C034	ECA1VM470	CAP,E 47UF/35V
C035	ECA1CM101	CAP,E 100UF/16V
C036	ECUX1H101JCX	CAP,C 100PF-J-50V
C045	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C046	ECUX1H101JCX	CAP,C 100PF-J-50V
C047	ECUX1H101JCX	CAP,C 100PF-J-50V
C048	ECUX1H101JCX	CAP,C 100PF-J-50V
C049	ECUX1H101JCX	CAP,C 100PF-J-50V
C051	EEUFC1E470B	CAP,E 47UF/16V
C052	TACCX103T50V	CAP,C .01UF/50V
C101	ECJ2VF1H223Z	CAP,C .022UF-Z050V
C102	ECA1HM100	CAP,E 10UF/50V
C103	ECUX1H300JCX	CAP,C 30PF-J-50V
C105	ECUX1H221JCX	CAP,C 220PF-J-50V
C106	ECA1HMR47	CAP,E .47UF/50V
C107	ECUX1H470JCX	CAP,C 47PF-J-50V
C108	ECA1HMR22	CAP,E .22UF/50V
C109	ECEA1HN100U	CAP,E 10UF/50V
C113	ECA1HM100	CAP,E 10UF/50V
C114	ECA1CM101	CAP,E 100UF/16V
C117	ECUX1H040CCX	CAP,C 4PF-C-50V
C126	ECA1CM331	CAP,E 330UF/16V
C151	ECA1HMR22	CAP,E .22UF/50V
C201	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C202	ECUX1H101JCX	CAP,C 100PF-J-50V
C203	ECA1HM100	CAP,E 10UF/50V
C301	ECUX1H390JCX	CAP,C 39PF-J-50V
C302	ECEA1HN010U	CAP,E 1UF/50V
C304	ECEA1HN010U	CAP,E 1UF/50V
C305	ECA1HMR47	CAP,E .47UF/50V
C306	ECA0JM331	CAP,E 330UF/6.3V
C308	ECQB1H823JM	CAP,P .082UF-J-50V
C309	ECA1CM101	CAP,E 100UF/16V
C310	ECA1HM4R7	CAP,E 4.7UF/50V
C311	ECA1HM010	CAP,E 1.0UF/50V
C312	ECA1HM100	CAP,E 10UF/50V
C313	ECQB1H473JM	CAP,P .047UF-J-50V
C351	ECA2EM100	CAP,E 10UF/250V
C353	ECKD2H103PU	CAP,C .01UF-P-500V
C354	ECA1HM100	CAP,E 10UF/50V
C356	ECKD3D332KB	CAP,C .0033UF-K-2KV
C357	ECEA1HN3R3U	CAP,E 3.3UF-50V
C359	ECKD3D102KB	CAP,C .001UF-K-2KV
C360	ECA1VM470	CAP,E 47UF/35V
C361	TACCW101T50V	CAP,C 100PF/50V
C363	ECKD3D102KB	CAP,C .001UF-K-2KV
C364	ECA1VM470	CAP,E 47UF/35V
C365	TACCW101T50V	CAP,C 100PF/50V
C366	ECA2EM100	CAP,E 10UF/250V
C371	ECA2EM100	CAP,E 10UF/250V
C373	ECKD2H103PU	CAP,C .01UF-P-500V
C374	ECA1HM100	CAP,E 10UF/50V
C376	ECKD3D332KB	CAP,C .0033UF-K-2KV
C377	ECEA1HN3R3U	CAP,E 3.3UF-50V
C379	ECKD3D102KB	CAP,C .001UF-K-2KV
C380	ECA1VM470	CAP,E 47UF/35V
C381	TACCW101T50V	CAP,C 100PF/50V
C391	ECA2EM100	CAP,E 10UF/250V
C393	ECKD2H103PU	CAP,C .01UF-P-500V
C394	ECA1HM100	CAP,E 10UF/50V
C396	ECKD3D332KB	CAP,C .0033UF-K-2KV
C397	ECEA1HN3R3U	CAP,E 3.3UF-50V
C401	ECQB1H682JM	CAP,P .0068UF-J-50V
C402	ECUX1H471KBX	CAP,C 470PF-K-50V
C403	ECA1HMR47	CAP,E .47UF/50V
C451	ECA1CM221	CAP,E 220UF/16V
C452	ECSF1EE105	CAP,T 1.0UF/25V
C453	ECEA1HFSR33	CAP,E .33UF/50V
C454	ECA1EHG222E	CAP,E 2200UF/25V
C455	ECA1VM101	CAP,E 100UF/35V
C456	ECQM1104KZ	CAP,P .1UF-K-100V
C457	ECEA1HFSR47	CAP,E .47UF/50V
C458	ECEA1HFSR47	CAP,E .47UF/50V
C459	ECA1VM471	CAP,E 470UF/35V
C460	ECQM1103KZ	CAP,P .01UF-K-100V
C461	ECCD2H180JC	CAP,C 18UF/500V
C463	ECQB1H103JM	CAP,P .01UF-J-50V
C464	TACCX103T50V	CAP,C .01UF/50V
C465	ECQB1H334KF	CAP,P .33UF-K-50V
C466	TACCX103T50V	CAP,C .01UF/50V

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C467	ECA1CM470	CAP,E 47UF/16V
C487	ECA1VM470	CAP,E 47UF/35V
C502	ECQB1H223JM	CAP,P .022UF-J-50V
C503	ECA1HM2R2	CAP,E 2.2UF/50V
C505	ECUX1H221JUX	CAP,C 220PF-J-50V
C506	ECA1CM101	CAP,E 100UF/16V
C521	ECKD2H332KB	CAP,C .0033UF-K-500V
C522	ECKD2H332KB	CAP,C .0033UF-K-500V
C551	**ECKD3D221JB**	**CAP,C 220PF-J-2KV**
C552	**ECKD3D152JB**	**CAP,C .0015UF-J-2KV**
C553	**ECKD3D152JB**	**CAP,C .0015UF-J-2KV**
C554	**ECQB1H563JM**	**CAP,P .056UF-J-50V**
C555	**ECWH12H392JS**	**CAP,P .0039UF-J-1.2KV**
C556	**ECKD3D181JB**	**CAP,C 180PF-J-2KV**
C557	**ECWH12H103JS**	**CAP,P .01UF-J-1.2KV**
C558	**ECQF4273JZH**	**CAP,P .027UF-J-400V**
C559	**ECKD3D391JB**	**CAP,C 390PF-J-2KV**
C560	**TAC7A2D474JC**	**CAP,P .47UF/200V**
C561	ECEA1HN2R2U	CAP,E 2.2UF/50V
C564	ECEA1CN220U	CAP,E 22UF-16V
C565	ECEA1HNR47U	CAP,E .47UF-50V
C581	**ECEA160V33Z**	**CAP,E 33UF/160V**
C582	ECKD2H102KB	CAP,C .001UF-K-500V
C583	**ECA2EM470**	**CAP,E 47UF-250V**
C584	ECKD2H471KB	CAP,C 470PF-K-500V
C585	**ECA1VM102**	**CAP,E 1000UF/35V**
C586	ECQE12473KF	CAP,P .047UF-K-1.25KV
C601	ECUX1H680JCX	CAP,C 68PF-J-50V
C604	ECUX1H120JUX	CAP,C 12PF-J-50V
C605	ECUX1H332KBX	CAP,C .0033UF-K-50V
C606	ECA1HM010	CAP,E 1.0UF/50V
C607	ECUX1H560JCX	CAP,C 56PF-J-50V
C608	TCUX1H103KBN	CAP,C .01UF-K-50V
C751	ECQE1335KF	CAP,P 3.3UF-K-100V
C752	ECA1CM101	CAP,E 100UF/16V
C755	ECA1VM470	CAP,E 47UF/35V
C804	**ECKD2H103ZF**	**CAP,C .01UF-Z-500V**
C805	**ECKD2H103ZF**	**CAP,C .01UF-Z-500V**
C806	**ECKD2H103ZF**	**CAP,C .01UF-Z-500V**
C809	ECQB1H223JM	CAP,P .022UF-J-50V
C815	ECQB1H152JM	CAP,P .0015UF-J-50V
C816	**EC0S2DA471BB**	**CAP,E 470UF/160V**
C817	**EC0S2DA471BB**	**CAP,E 470UF/160V**
C818	ECKD3A392KB	CAP,C 3900PF-K-1KV
C819	ECQB1H102JM	CAP,P .001UF-J-50V
C820	ECA1VM470	CAP,E 47UF/35V
C821	ECQB1H102JM	CAP,P .001UF-J-50V
C822	TACCW391T50V	CAP,C 390PF/50V
C823	ECQB1H471JF	CAP,P .0047UF-J-50V
C824	ECA1VHG101B	CAP,E 100UF-35V
C825	ECQB1H473JM	CAP,P .047UF-J-50V
C826	ECQB1H683JM	CAP,P .068UF-J-50V
C827	ECQB1H104JM	CAP,P .1UF-J-50V
C828	ECQB1H473JM	CAP,P .047UF-J-50V
C829	**ECKCNB472ME**	**CAP,C 4700PF-M-250V**
C830	**ECKCNB472ME**	**CAP,C 4700PF-M-250V**
C831	ECKD3D681KB	CAP,C 680PF-K-2KV
C832	**ECES2DU221EG**	**CAP,E 220UF-200V**
C833	ECKD3A471KB	CAP,C 470PF-K-1KV
C834	ECA1EM102	CAP,E 1000UF/25V
C835	ECKD3A471KB	CAP,C 470PF-K-1KV
C836	ECA1CM102	CAP,E 1000UF/16V
C837	ECKD3A471KB	CAP,C 470PF-K-1KV
C838	**ECA1VM222**	**CAP,E 2200UF/35V**
C839	ECKD3A471KB	CAP,C 470PF-K-1KV
C840	**ECA1VM222**	**CAP,E 2200UF/35V**
C841	ECKD3A471KB	CAP,C 470PF-K-1KV
C842	**ECA1HM102**	**CAP,E 1000UF/50V**
C844	ECKD3D681KB	CAP,C 680PF-K-2KV
C845	ECQB1H104JM	CAP,P .1UF-J-50V
C846	ECA1CM101	CAP,E 100UF/16V
C847	ECA0JM331	CAP,E 330UF/6.3V
C848	ECA1CM101	CAP,E 100UF/16V
C849	ECA1HM100	CAP,E 10UF/50V
C850	ECA1EM220	CAP,E 22UF/25V
C851	ECA1CM470	CAP,E 47UF/16V
C852	ECA1CM470	CAP,E 47UF/16V
C870	**ECKCNB472ME**	**CAP,C 4700PF-M-250V**
C880	ECA1CM101	CAP,E 100UF/16V
C881	ECA1CM101	CAP,E 100UF/16V
C882	ECA1CM101	CAP,E 100UF/16V
C883	ECA1CM101	CAP,E 100UF/16V
C884	ECA1VM470	CAP,E 47UF/35V
C885	ECEA1CN101U	CAP,E 100UF-16V
C886	ECA1CM221	CAP,E 220UF/16V
C888	ECA1VM470	CAP,E 47UF/35V
C889	TCUX1H103KBN	CAP,C .01UF-K-50V
C890	TCUX1H103KBN	CAP,C .01UF-K-50V
C1551	ECEA1EN101U	CAP,E 100UF-25V
C1552	ECA1CM101	CAP,E 100UF/16V
C1553	ECQB1H683JM	CAP,P .068UF-J-50V
C1571	ECKD2H181KB	CAP,C 180PF-K-500V
C1572	ECEA1HN100U	CAP,E 10UF/50V
C1582	**ECA1HM470**	**CAP,E 47UF/50V**
C1583	ECA1HM220	CAP,E 22UF/50V
C1584	ECA1VM470	CAP,E 47UF/35V
C1585	ECA1CM221	CAP,E 220UF/16V
C1586	TACCX103T50V	CAP,C .01UF/50V
C1587	ECA1HM4R7	CAP,E 4.7UF/50V
C1588	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1801	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1802	ECQV1H154JM	CAP,P .15UF-J-50V

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C1803	ECEA1HKAR22	CAP,E .22UF/50V
C1804	ECEA1HKAR22	CAP,E .22UF/50V
C1805	ECJ2VF1H333Z	CAP,C .033UF-Z-50V
C1806	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1807	ECEA1CKA470	CAP,E 47UF/16V
C1808	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1809	ECEA1CKA470	CAP,E 47UF/16V
C1810	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1811	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1812	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1813	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1814	ECEA1CKA470	CAP,E 47UF/16V
C1815	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1816	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1817	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1818	ECEA1CKA100	CAP,E 10UF/16V
C1819	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1820	ECEA1CKA470	CAP,E 47UF/16V
C1821	ECUX1H150JCX	CAP,C 15PF-J-50V
C1822	ECUX1H120JCX	CAP,C 12PF-J-50V
C1823	ECUX1H680JCX	CAP,C 68PF-J-50V
C1826	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1827	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1828	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C1829	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1830	ECUX1H151JCX	CAP,C 150PF-J-50V
C1831	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1832	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1833	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1835	ECEA1CKA100	CAP,E 10UF/16V
C1836	ECUX1H560JCX	CAP,C 56PF-J-50V
C1839	ECUX1H101JCX	CAP,C 100PF-J-50V
C1840	ECUX1H101JCX	CAP,C 100PF-J-50V
C1901	ECA1HM100	CAP,E 10UF/50V
C1902	ECQB1H223JM	CAP,P .022UF-J-50V
C1903	ECA1CM101	CAP,E 100UF/16V
C1904	ECA1CM101	CAP,E 100UF/16V
C1905	ECEA1HN010U	CAP,E 1UF/50V
C1906	ECUX1H821JCX	CAP,C 820PF-J-50V
C1907	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1908	ECA1HM010	CAP,E 1.0UF/50V
C1909	ECUX1H102JCX	CAP,C .001UF-J-50V
C1910	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C1911	ECEA1HN010U	CAP,E 1UF/50V
C1915	ECQB1H184JF	CAP,P .18UF-J-50V
C1917	ECA1HM3R3	CAP,E 3.3UF/50V
C1922	ECEA1HN010U	CAP,E 1UF/50V
C2104	ECA1CM102	CAP,E 1000UF/16V
C2105	ECA0JM101	CAP,E 100UF/6.3V
C2106	ECA1HMR47	CAP,E .47UF/50V
C2108	ECA1CM330	CAP,E 33UF/16V
C2109	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2111	ECEA1HFSR22	CAP,E .22UF/50V
C2114	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2115	ECA1HM100	CAP,E 10UF/50V
C2116	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2117	ECUX1H820JCX	CAP,C 82PF-J-50V
C2118	ECUX1H270JCX	CAP,C 27PF-J-50V
C2119	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2120	ECEA1HFSR47	CAP,E .47UF/50V
C2121	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2123	ECUX1H270JCX	CAP,C 27PF-J-50V
C2124	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C2125	ECA1CM100	CAP,E 10UF/16V
C2126	ECA1HMR22	CAP,E .22UF/50V
C2201	ECSF16E3R3	CAP,T 3.3UF/16V
C2202	ECA1HM4R7	CAP,E 4.7UF/50V
C2203	ECA1HM010	CAP,E 1.0UF/50V
C2204	ECA1HM4R7	CAP,E 4.7UF/50V
C2205	ECA1HM4R7	CAP,E 4.7UF/50V
C2206	ECA1HM4R7	CAP,E 4.7UF/50V
C2207	ECA1HM4R7	CAP,E 4.7UF/50V
C2208	ECA1HM4R7	CAP,E 4.7UF/50V
C2209	ECA1CM101	CAP,E 100UF/16V
C2210	ECA1HMR33	CAP,E .33UF/50V
C2211	ECEA1HFSR68	CAP,E .68UF-50V
C2212	ECA1HM2R2	CAP,E 2.2UF/50V
C2213	ECA1HM100	CAP,E 10UF/50V
C2214	ECQB1H104JM	CAP,P .1UF-J-50V
C2215	ECQB1H223JM	CAP,P .022UF-J-50V
C2216	ECUX1H332KBX	CAP,C .0033UF-K-50V
C2219	ECSF16E10VB	CAP,T 10PF-16V
C2222	TCUX1H103KBN	CAP,C .01UF-K-50V
C2231	TCUX1H103KBN	CAP,C .01UF-K-50V
C2232	ECUX1H472KBX	CAP,C .0047UF-K-50V
C2301	ECA1HM102	CAP,E 1000UF/50V
C2302	ECA1HM010	CAP,E 1.0UF/50V
C2303	ECUX1H821KBX	CAP,C 820PF-K-50V
C2304	ECUX1H821KBX	CAP,C 820PF-K-50V
C2305	ECA1HM010	CAP,E 1.0UF/50V
C2306	ECA1HM102	CAP,E 1000UF/50V
C2307	ECA1HM102	CAP,E 1000UF/50V
C2309	ECQB1H104JM	CAP,P .1UF-J-50V
C2310	ECEA1CN100U	CAP,E 10UF-16V
C2312	ECA1VM101	CAP,E 100UF/35V
C2313	ECA1VM101	CAP,E 100UF/35V
C2314	ECQB1H104JM	CAP,P .1UF-J-50V
C2315	TCUX1H103KBN	CAP,C .01UF-K-50V
C2316	ECA1HM220	CAP,E 22UF/50V
C2331	ECEA1CKA100	CAP,E 10UF/16V
C2332	ECEA1CKA100	CAP,E 10UF/16V
C2333	ECEA1HKA010	CAP,E 1.0UF/50V

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C2334	ECEA1HKA010	CAP,E 1.0UF/50V
C2335	ECEA1HKN010	CAP,E 1.0UF/50V
C2336	ECEA1HKN010	CAP,E 1.0UF/50V
C2344	ECEA1AKA221	CAP,E 220UF/10V
C2404	ECA1HM4R7	CAP,E 4.7UF/50V
C2405	ECA1HM4R7	CAP,E 4.7UF/50V
C2406	ECA1HM4R7	CAP,E 4.7UF/50V
C2407	ECA1HM2R2	CAP,E 2.2UF/50V
C2408	ECA1HM100	CAP,E 10UF/50V
C2409	TCUX1H103KBN	CAP,C .01UF-K-50V
C2417	ECA1HM100	CAP,E 10UF/50V
C2419	ECA1HM0R1	CAP,E 0.1UF/50V
C2420	ECQB1H104JM	CAP,P .1UF-J-50V
C2421	ECA1HM470	CAP,E 47UF/50V
C2422	ECUX1H472KBX	CAP,C .0047UF-K-50V
C2423	ECA1HM0R1	CAP,E 0.1UF/50V
C2425	ECA1HM4R7	CAP,E 4.7UF/50V
C2432	ECEA1CN100U	CAP,E 10UF-16V
C2433	ECEA1CN100U	CAP,E 10UF-16V
C2802	**ECQU2A224MV**	**CAP,P .22UF-M-250VAC**
C2805	**ECKDNA471MB**	**CAP,C 470PF-M-125VAC**
C2806	**ECKDNA471MB**	**CAP,C 470PF-M-125VAC**
C2807	ECA1EHG102E	CAP,E 1000UF-25V
C2808	ECKF1H103ZF	CAP,C .01UF-Z-50V
C3001	ECEA1CKA100	CAP,E 10UF/16V
C3002	ECEA1CKA100	CAP,E 10UF/16V
C3003	ECEA1HKA010	CAP,E 1.0UF/50V
C3004	ECEA1HKA010	CAP,E 1.0UF/50V
C3005	ECEA1CKA100	CAP,E 10UF/16V
C3008	ECEA1HKA010	CAP,E 1.0UF/50V
C3009	ECEA1CKA100	CAP,E 10UF/16V
C3012	ECEA1CKA101	CAP,E 100UF/16V
C3013	ECEA1HKA010	CAP,E 1.0UF/50V
C3014	ECEA1CKA220	CAP,E 22UF/16V
C3016	ECEA1CKA470	CAP,E 47UF/16V
C3020	TACCW103T50V	CAP,C .01UF/50V
C3021	TACCW103T50V	CAP,C .01UF/50V
C3023	TACCW103T50V	CAP,C .01UF/50V
C3026	TACCW103T50V	CAP,C .01UF/50V
C3030	ECEA1CKN100	CAP,E 10UF/16V
C3050	ECA1HM0R1	CAP,E 0.1UF/50V
C3051	ECUX1H472KBX	CAP,C .0047UF-K-50V
C3105	TACCX103T50V	CAP,C .01UF/50V
C3200	ECA1CM101	CAP,E 100UF/16V
C3201	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C3206	TCUX1H103KBN	CAP,C .01UF-K-50V
C3207	ECUX1H820JCX	CAP,C 82PF-J-50V
C3208	ECUX1H102KBX	CAP,C .001UF-K-50V
C3209	ECUX1H820JCX	CAP,C 82PF-J-50V
C3210	ECUX1H220JCX	CAP,C 22PF-J-50V
C3230	ECEA1EN470U	CAP,E 47UF/25V

REF NO.	PART NO.	DESCRIPTION
C3231	ECEA1EN470U	CAP,E 47UF/25V
C3301	ECA1VM470	CAP,E 47UF/35V
C3580	TCUX1H103KBN	CAP,C .01UF-K-50V
C3581	ECEA1CN470U	CAP,E 47UF-16V
C4107	ECUX1H331JCX	CAP,C 330PF-J-50V
C4108	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C4109	ECUX1H271JCX	CAP,C 270PF-J-50V
C4110	ECA1HM100	CAP,E 10UF/50V
C4112	ECA1CM101	CAP,E 100UF/16V
C4131	ECUX1H471JCX	CAP,C 470PF-J-50V
C4141	ECUX1H471JCX	CAP,C 470PF-J-50V
C4142	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C4151	ECUX1H561JCX	CAP,C 560PF-J-50V
C4251	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C4303	ECUX1H151JCX	CAP,C 150PF-J-50V
C4304	ECEA1CKA100	CAP,E 10UF/16V
C4313	ECUX1H391KBX	CAP,C 390PF-K-50V
C4314	ECEA1HKA010	CAP,E 1.0UF/50V
C4315	ECUX1H152JCX	CAP,C .0015UF-J-50V
C4316	ECEA0JKA331	CAP,E 330UF/6.3V
C4317	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C4319	ECUX1H391JCX	CAP,C 390PF-J-50V
C4320	ECUX1H271JCX	CAP,C 270PF-J-50V
C6501	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6504	ECEA1CKA470	CAP,E 47UF/16V
C6505	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6506	ECEA1CKA470	CAP,E 47UF/16V
C6507	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6508	ECEA1CKA470	CAP,E 47UF/16V
C6509	ECEA1CKA100	CAP,E 10UF/16V
C6510	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6511	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6512	ECEA1CKA100	CAP,E 10UF/16V
C6513	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6514	ECEA1CKA100	CAP,E 10UF/16V
C6515	ECEA1CKA101	CAP,E 100UF/16V
C6516	ECUX1H472KBX	CAP,C .0047UF-K-50V
C6517	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6518	ECEA1CKA470	CAP,E 47UF/16V
C6519	ECUX1H150JCX	CAP,C 15PF-J-50V
C6520	ECUX1H470JCX	CAP,C 47PF-J-50V
C6521	ECUX1H150JCX	CAP,C 15PF-J-50V
C6522	ECEA1CKA470	CAP,E 47UF/16V
C6523	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6524	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6526	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6527	ECEA1CKA470	CAP,E 47UF/16V
C6528	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6530	ECUX1H470JCX	CAP,C 47PF-J-50V
C6533	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C6539	ECEA1CKA470	CAP,E 47UF/16V

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C6542	ECEA1CKA100	CAP,E 10UF/16V
C6543	ECUX1H470JCX	CAP,C 47PF-J-50V
C6546	ECUX1H150JCX	CAP,C 15PF-J-50V
C6547	ECUX1H470JCX	CAP,C 47PF-J-50V
C6548	ECUX1H150JCX	CAP,C 15PF-J-50V
C6549	ECEA1CKA100	CAP,E 10UF/16V
C7001	ECA1HM2R2	CAP,E 2.2UF/50V
C7002	ECA1HM2R2	CAP,E 2.2UF/50V
C7003	ECA1HM101	CAP,E 100UF/50V
C7004	ECA1HM101	CAP,E 100UF/50V
C7005	ECA1HM101	CAP,E 100UF/50V
C7006	ECA1HM101	CAP,E 100UF/50V
C7011	ECUX1H151JCX	CAP,C 150PF-J-50V
C7012	ECUX1H151JCX	CAP,C 150PF-J-50V
C7013	ECUX1H151JCX	CAP,C 150PF-J-50V
C7014	ECUX1H151JCX	CAP,C 150PF-J-50V
C7015	ECUX1H151JCX	CAP,C 150PF-J-50V
C7016	ECUX1H151JCX	CAP,C 150PF-J-50V
C7023	TCUX1H103KBN	CAP,C .01UF-K-50V
C7024	TCUX1H103KBN	CAP,C .01UF-K-50V
C7025	TCUX1H103KBN	CAP,C .01UF-K-50V
C7026	TCUX1H103KBN	CAP,C .01UF-K-50V
C7101	TCUY1C105KBM	CAP,C 1UF-K-16V
C7102	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7103	ECJ2VF1H473Z	CAP,C .047-Z-50V
C7104	ECA1CM101	CAP,E 100UF/16V
C7105	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7106	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7107	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7108	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7109	ECA1CM101	CAP,E 100UF/16V
C7110	ECA1CM101	CAP,E 100UF/16V
C7112	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7113	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7114	ECA1CM101	CAP,E 100UF/16V
C7117	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7118	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7120	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7122	ECUX1H101JCX	CAP,C 100PF-J-50V
C7123	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7124	ECUX1H101JCX	CAP,C 100PF-J-50V
C7125	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C7126	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7127	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C7128	ECA1CM101	CAP,E 100UF/16V
C7130	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7131	ECA1CM101	CAP,E 100UF/16V
C7132	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7133	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7134	ECA1CM101	CAP,E 100UF/16V
C7136	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7137	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7138	ECUX1H331JCX	CAP,C 330PF-J-50V
C7139	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7140	ECA1CM101	CAP,E 100UF/16V
C7141	ECA1CM101	CAP,E 100UF/16V
C7142	ECUX1H220JCX	CAP,C 22PF-J-50V
C7143	ECUX1H220JCX	CAP,C 22PF-J-50V
C7144	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7145	ECUX1H151JCX	CAP,C 150PF-J-50V
C7146	ECA1CM101	CAP,E 100UF/16V
C7147	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7148	ECUX1H471JCX	CAP,C 470PF-J-50V
C7149	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7150	ECA1CM101	CAP,E 100UF/16V
C7151	ECA1CM101	CAP,E 100UF/16V
C7152	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7153	ECA1CM101	CAP,E 100UF/16V
C7154	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7155	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7156	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7157	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7158	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7159	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7160	ECA1CM101	CAP,E 100UF/16V
C7161	ECA1CM101	CAP,E 100UF/16V
C7162	ECA1CM101	CAP,E 100UF/16V
C7163	ECA1CM101	CAP,E 100UF/16V
C7164	ECA1CM101	CAP,E 100UF/16V
C7165	ECA1CM101	CAP,E 100UF/16V
C7166	ECA1CM101	CAP,E 100UF/16V
C7168	ECA1CM101	CAP,E 100UF/16V
C7169	ECUX1H181JCX	CAP,C 180PF-J-50V
C7170	ECUX1H181JCX	CAP,C 180PF-J-50V
C7171	ECUX1H181JCX	CAP,C 180PF-J-50V
C7172	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7173	ECUX1H331JCX	CAP,C 330PF-J-50V
C7174	ECUX1H331JCX	CAP,C 330PF-J-50V
C7175	ECUX1H331JCX	CAP,C 330PF-J-50V
C7176	ECUX1H331JCX	CAP,C 330PF-J-50V
C7177	ECUX1H331JCX	CAP,C 330PF-J-50V
C7178	ECUX1H331JCX	CAP,C 330PF-J-50V
C7179	ECUX1H181JCX	CAP,C 180PF-J-50V
C7180	ECUX1H181JCX	CAP,C 180PF-J-50V
C7181	ECUX1H181JCX	CAP,C 180PF-J-50V
C7182	ECUX1H682KBX	CAP,C .0068UF-K-50V
C7183	ECA1CM101	CAP,E 100UF/16V
C7184	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7185	ECUX1H682KBX	CAP,C .0068UF-K-50V
C7186	ECUX1H682KBX	CAP,C .0068UF-K-50V
C7187	ECUX1H682KBX	CAP,C .0068UF-K-50V
C7188	ECUX1H682KBX	CAP,C .0068UF-K-50V

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C7189	ECUX1H682KBX	CAP,C .0068UF-K-50V
C7190	ECA1CM101	CAP,E 100UF/16V
C7191	TCUX1H103ZFN	CAP,C .01UF-Z-50V
C7197	ECUX1H101JCX	CAP,C 100PF-J-50V
C7198	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
DIODES		
D003	MA4047M	DIODE, ZENER
D005	MA151K	DIODE
D007	MA151K	DIODE
D008	MA151K	DIODE
D009	MA4043M	DIODE, ZENER
D010	MA4062M	DIODE, ZENER
D011	MA4062M	DIODE, ZENER
D024	MA4330M	DIODE
D025	MA4051L	DIODE, ZENER
D026	MA4051L	DIODE, ZENER
D027	MA4051L	DIODE, ZENER
D030	MA4051L	DIODE, ZENER
D039	MA151K	DIODE
D059	MA151K	DIODE
D201	MA4110M	DIODE, ZENER
D356	MA165	DIODE
D357	MA185	DIODE
D359	MA165	DIODE
D360	MA165	DIODE
D361	MA165	DIODE
D363	MA4100M	DIODE, ZENER
D364	MA167	DIODE
D365	MA29T-ATA	DIODE
D376	MA165	DIODE
D377	MA185	DIODE
D396	MA165	DIODE
D397	MA185	DIODE
D399	TVSRM1	DIODE
D451	ERA15-01	DIODE
D452	MA2330-B	DIODE
D453	MA2330-B	DIODE
D454	MA4360M	DIODE
D455	MA4062L	DIODE
D456	MA4062L	DIODE
D457	MA4120M	DIODE
D458	MA165	DIODE
D459	MA165	DIODE
D460	MA165	DIODE
D461	MA165	DIODE
D462	MA165	DIODE
D463	MA165	DIODE
D464	MA165	DIODE
D501	MA4082L	DIODE
D532	**MA4062L**	**DIODE**
D551	**RH3FLFS1**	**DIODE**
D552	**S2L60P1518**	**DIODE**
D553	**MA4270M**	**DIODE**
D561	MA165	DIODE
D562	MA4039M	DIODE, ZENER
D564	MA165	DIODE
D581	**ERA22-04**	**DIODE, ZENER**
D582	**AU02**	**DIODE**
D583	**RP1H**	**DIODE**
D756	MA165	DIODE
D802	**RBV-408**	**BRIDGE, RECTIFIER**
D804	MA165	DIODE
D816	MA700	DIODE
D817	AU01Z	DIODE
D818	MA4220L	DIODE, ZENER
D819	**TMPG10G3**	**DIODE**
D821	MA165	DIODE
D822	ERA22-02	DIODE
D831	**RU30ALFS1**	**DIODE, RECTIFIER**
D832	**RU3YX-M**	**DIODE**
D833	**RU3YX-MLF-C4**	**DIODE**
D834	**RL3ZLFS1**	**DIODE**
D835	**RL3ZLFS1**	**DIODE**
D836	**RL4ZLF-L1**	**DIODE**
D837	MA165	DIODE
D838	MA4047L	DIODE, ZENER
D839	MA4033M	DIODE, ZENER
D840	MA167	DIODE
D841	MA165	DIODE
D843	MA165	DIODE
D844	MA4020	DIODE
D845	MA151K	DIODE
D846	MA151K	DIODE
D847	MA165	DIODE
D848	MA165	DIODE
D849	MA165	DIODE
D1110	MA151K	DIODE
D1551	MA165	DIODE
D1552	MA29-B	DIODE
D1571	MA165	DIODE
D1581	**AS01**	**DIODE**
D1583	**MA4062L**	**DIODE**
D1584	**MA4330M**	**DIODE**
D1585	**MA4330M**	**DIODE**
D1901	MA4110M	DIODE, ZENER
D2101	MA3330M	DIODE
D2301	MA4390M	DIODE
D2354	MA4180M	DIODE, ZENER
D2801	**ERZC10VK361G**	**VARISTOR**
D2803	ERA15-01	DIODE
D3001	MA151K	DIODE
D3004	MA165	DIODE

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
D3012	MA4110	DIODE, ZENER
D3013	MA4110	DIODE, ZENER
D3014	MA4110	DIODE, ZENER
D3015	MA4110	DIODE, ZENER
D3016	MA4110	DIODE, ZENER
D3017	MA4110	DIODE, ZENER
D3018	MA4110	DIODE, ZENER
D3020	MA4110	DIODE, ZENER
D3022	MA4110	DIODE, ZENER
D3023	MA4110	DIODE, ZENER
D3024	MA4110	DIODE, ZENER
D3025	MA4110	DIODE, ZENER
D3100	MA151K	DIODE
D3101	MA151K	DIODE
D3200	MA151K	DIODE
D3201	MA151K	DIODE
D3580	MA151K	DIODE
D4104	MA151W	DIODE
D4105	MA151K	DIODE
D4106	MA4056M	DIODE
D4107	MA151K	DIODE
D4109	MA151K	DIODE
D4110	MA151K	DIODE
D4111	MA151K	DIODE
D4112	MA151K	DIODE
D4134	MA151K	DIODE
D4144	MA151K	DIODE
D4154	MA151K	DIODE
D4301	MA3036H	DIODE
FUSES		
F2801	**0BA1C63NU100**	**FUSE (6.3A-125V)**
INTEGRATED CIRCUITS		
IC001	**MN1874085TP1**	**INT CKT**
IC002	24LC04BIP	INT CKT
IC101	**AN5165K**	**INT CKT**
IC451	**LA7838**	**INT CKT**
IC452	BA15218N	INT CKT
IC801	**AN8026**	**INT CKT**
IC802	**SE139NLF4**	**ERROR AMP**
IC811	**TLP621GR**	**PHOTO COUPLER**
IC831	AN7812	INT CKT
IC832	AN7809	INT CKT
IC833	AN7805	INT CKT
IC834	AN79M12	INT CKT
IC1801	M65617SP	INT CKT
IC2101	AN5170K	INT CKT
IC2201	AN5819K	INT CKT
IC2202	TC4066BP	INT CKT
IC2301	AN5275	INT CKT
IC2331	BA15218N	INT CKT
IC2401	CXA2021S	INT CKT

REF NO.	PART NO.	DESCRIPTION
IC3031	M52055P	INT CKT
IC3301	AN5862K	INT CKT
IC3580	TC4066BP	INT CKT
IC4301	TC74HC4066AL	INT CKT
IC4402	TC4066BP	INT CKT
IC6501	MC141622AFT	INT CKT
IC7001	STK392-110	INT CKT
IC7002	STK392-110	INT CKT
IC7101	24LC32TI/SM	EPROM
IC7102	SN74HC74NSTL	INT CKT
IC7103	JLC1562BFEL	INT CKT
IC7104	TLC2932IPWL	INT CKT
IC7105	MC33064D-5R2	RST IC
IC7106	SC430409CFC	INT CKT
IC7107	TVSA0030	INT CKT
IC7108	TVSA0342	INT CKT
IC7109	M62354FP-E2	INT CKT
IC7110	TVSA0036	INT CKT
IC7111	LC78815M-TLM	INT CKT
IC7112	LC78815M-TLM	INT CKT
IC7113	LC78815M-TLM	INT CKT
IC7116	UPC4570G2-E2	INT CKT
IC7117	UPC4570G2-E2	INT CKT
IC7118	UPC4570G2-E2	INT CKT
IC7120	SN74HC00NSL	INT CKT
COILS		
LC3201	EXCEMT101BTS	L-C NETWORK
LC3202	EXCEMT101BTS	L-C NETWORK
LC3203	EXCEMT101BTS	L-C NETWORK
LC3204	EXCEMT101BTS	L-C NETWORK
L001	EXCELSA35T	FERRITE BEAD
L003	TLUABTA4R7K	COIL, PEAKING 4.7UH
L004	TLUABTA4R7K	COIL, PEAKING 4.7UH
L005	TLUABTA100K	COIL, PEAKING 10UH
L008	TLUABTA120K	COIL, PEAKING 12UH
L009	EXCELSA35T	FERRITE BEAD
L013	EXCELSA35T	FERRITE BEAD
L014	EXCELSA35T	FERRITE BEAD
L021	TLTACT390K	COIL, PEAKING 39UH
L103	TLTACT120J	COIL, PEAKING 12UH
L104	TLUABTA1R0K	COIL, PEAKING 1.0UH
L105	EIV7EN053B	COIL, VCO
L106	TLTACT180J	COIL, PEAKING 18UH
L107	TLUABTA1R0K	COIL, PEAKING 1.0UH
L108	TLUABTA1R0K	COIL, PEAKING 1.0UH
L109	EXCELSA35T	FERRITE BEAD
L110	TLUABTA1R0K	COIL, PEAKING 1.0UH
L351	ELEBD101KA	COIL, PEAKING 100UH
L352	TLTACT820K	COIL, PEAKING 82UH
L353	TLTACT820K	COIL, PEAKING 82UH
L371	ELEBD101KA	COIL, PEAKING 100UH

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

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REF NO.	PART NO.	DESCRIPTION
L372	TLTACT820K	COIL, PEAKING 82UH
L373	TLTACT820K	COIL, PEAKING 82UH
L391	ELEBD101KA	COIL, PEAKING 100UH
L392	TLTACT820K	COIL, PEAKING 82UH
L393	TLTACT820K	COIL, PEAKING 82UH
L552	EXCELSA35B	FERRITE BEAD
L553	EXCELSA35B	FERRITE BEAD
L581	EXCELDR35C	FERRITE BEAD
L751	TLH15733M	COIL, TOP/BOTTOM PHASING
L805	EXCELSA35T	FERRITE BEAD
L806	EXCELSA35T	FERRITE BEAD
L808	EXCELDR35	FERRITE BEAD
L810	EXCELSA35T	FERRITE BEAD
L811	EXCELSA35T	FERRITE BEAD
L812	EXCELSA35B	FERRITE BEAD
L831	EXCELSA35B	FERRITE BEAD
L832	EXCELSA39E	FERRITE BEAD
L833	TLP15103S	COIL, CHOKE
L834	EXCELSA35T	FERRITE BEAD
L835	EXCELSA35T	FERRITE BEAD
L836	EXCELSA35T	FERRITE BEAD
L837	EXCELSA35T	FERRITE BEAD
L838	EXCELSA35T	FERRITE BEAD
L839	EXCELSA35T	FERRITE BEAD
L841	ELEIE220KA	COIL 22UH
L842	ELEIE220KA	COIL 22UH
L843	EXCELSA35T	FERRITE BEAD
L883	TLUABTA100K	COIL, PEAKING 10UH
L884	TLTACT100K	COIL, PEAKING 10UH
L1109	TLTACT100J	COIL, PEAKING 10UH
L1110	TLTACT100J	COIL, PEAKING 10UH
L1801	TLTACT1R5K	COIL, PEAKING 1.5UH
L1803	TLTACT2R2K	COIL, PEAKING 2.2UH
L1804	TLTACT150J	COIL, PEAKING 15UH
L1806	TLTACT1R0K	COIL, PEAKING 1UH
L1807	TLTACT1R0K	COIL, PEAKING 1UH
L1808	EXCELDR25	FERRITE BEAD
L2101	TLTACT120K	COIL, PEAKING 12UH
L2103	TLTACT150K	COIL, PEAKING 15UH
L2104	TLTACT330K	COIL, PEAKING 33UH
L2105	TLTACT1R2K	COIL, PEAKING 1.2UH
L2106	TLTACT560K	COIL, PEAKING 56UH
L2107	TLTACT1R2K	COIL, PEAKING 1.2UH
L2109	EIV7EN053B	COIL, VCO
L2201	ELESN102JA	COIL, PEAKING 1000UH
L2202	ELESN471JA	COIL, PEAKING 470UH
L2801	**ELF18D850B**	**LINE FILTER**
L2802	**ELF18D650M**	**LINE FILTER**
L3204	TLTACT120K	COIL, PEAKING 12UH
L3210	TLUABTA100K	COIL, PEAKING 10UH
L3308	TLTACT100K	COIL, PEAKING 10UH

REF NO.	PART NO.	DESCRIPTION
L3333	TLTACT100K	COIL, PEAKING 10UH
L4301	TLTACT2R2K	COIL, PEAKING 2.2UH
L6501	TLTACT220K	COIL, PEAKING 22UH
L6505	TLTACT390K	COIL, PEAKING 39UH
L6506	TLTACT390K	COIL, PEAKING 39UH
L6507	TLTACT220K	COIL, PEAKING 22UH
L6508	TLTACT220K	COIL, PEAKING 22UH
L6509	TLTACT3R3K	COIL, PEAKING 3.3UH
L6511	TLTACT390K	COIL, PEAKING 39UH
L6512	TLTACT390K	COIL, PEAKING 39UH
L6517	EXCELDR25C	FERRITE BEAD
L7032	TLUABTA1R0K	COIL, PEAKING 1.0UH
L7101	EXCELDR35	FERRITE BEAD
L7103	EXCELDR35	FERRITE BEAD
L7104	EXCELDR35	FERRITE BEAD
L7105	EXCELDR35	FERRITE BEAD
L7106	TLTACT330J	COIL, PEAKING 33UH
TRANSISTORS		
Q001	2SB709ARTX	TRANSISTOR
Q002	2SD601ARTX	TRANSISTOR
Q004	2SB709ARTX	TRANSISTOR
Q005	2SD601ARTX	TRANSISTOR
Q302	2SD601ARTX	TRANSISTOR
Q303	2SB709ARTX	TRANSISTOR
Q304	2SB709ARTX	TRANSISTOR
Q305	2SD601ARTX	TRANSISTOR
Q306	2SD601ARTX	TRANSISTOR
Q353	2SC3063	TRANSISTOR
Q356	2SB1011	TRANSISTOR
Q373	2SC3063	TRANSISTOR
Q376	2SB1011	TRANSISTOR
Q393	2SC3063	TRANSISTOR
Q396	2SB1011	TRANSISTOR
Q397	2SC1473A	TRANSISTOR
Q398	2SC1473A	TRANSISTOR
Q401	2SD601ARTX	TRANSISTOR
Q402	2SB709ARTX	TRANSISTOR
Q410	2SD601ARTX	TRANSISTOR
Q411	2SD601ARTX	TRANSISTOR
Q451	2SC1685QRS	TRANSISTOR
Q452	2SC1685QRS	TRANSISTOR
Q453	2SC1685QRS	TRANSISTOR
Q501	2SC4212H	TRANSISTOR
Q551	**2SD2553MA**	**TRANSISTOR**
Q561	2SC1685QRS	TRANSISTOR
Q601	2SD601ARTX	TRANSISTOR
Q602	2SD601ARTX	TRANSISTOR
Q751	2SD1499P	TRANSISTOR
Q752	2SA564AQRSTA	TRANSISTOR
Q753	2SC1685QRS	TRANSISTOR
Q801	**FS18SM-10-AB**	**TRANSISTOR**

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
Q802	2SC1685QRS	TRANSISTOR
Q803	2SA564AQRSTA	TRANSISTOR
Q810	2SC1685QRS	TRANSISTOR
Q831	2SA19610QAHW	TRANSISTOR
Q832	2SA564AQRSTA	TRANSISTOR
Q833	2SC1473R	TRANSISTOR
Q834	2SB709ARTX	TRANSISTOR
Q1110	2SD601ARTX	TRANSISTOR
Q1551	2SA564AQRSTA	TRANSISTOR
Q1552	2SC4635-YB7	TRANSISTOR
Q1553	2SC1685QRS	TRANSISTOR
Q1571	2SC1473R	TRANSISTOR
Q1572	2SC1473R	TRANSISTOR
Q1581	2SC1685QRS	TRANSISTOR
Q1582	2SD601ARTX	TRANSISTOR
Q1583	2SA564AQRSTA	TRANSISTOR
Q1801	2SD601ARTX	TRANSISTOR
Q1802	2SD601ARTX	TRANSISTOR
Q1803	2SD601ARTX	TRANSISTOR
Q1804	2SB709ARTX	TRANSISTOR
Q1805	2SB709ARTX	TRANSISTOR
Q1901	2SC1685QRS	TRANSISTOR
Q1902	2SC1685QRS	TRANSISTOR
Q1903	2SD601ARTX	TRANSISTOR
Q1904	2SD601ARTX	TRANSISTOR
Q1905	2SD601ARTX	TRANSISTOR
Q1906	2SD601ARTX	TRANSISTOR
Q1907	2SD601ARTX	TRANSISTOR
Q1908	2SD601ARTX	TRANSISTOR
Q1909	2SD601ARTX	TRANSISTOR
Q2101	2SD601ARTX	TRANSISTOR
Q2201	2SD601ARTX	TRANSISTOR
Q2202	2SD601ARTX	TRANSISTOR
Q2203	2SD601ARTX	TRANSISTOR
Q2204	2SD601ARTX	TRANSISTOR
Q2331	2SC1685QRS	TRANSISTOR
Q2332	2SC1685QRS	TRANSISTOR
Q2333	2SA564AQRSTA	TRANSISTOR
Q3001	2SC1685QRS	TRANSISTOR
Q3003	2SC1685QRS	TRANSISTOR
Q3004	2SC1685QRS	TRANSISTOR
Q3005	2SC1685QRS	TRANSISTOR
Q3006	2SC1685QRS	TRANSISTOR
Q3010	2SC1685QRS	TRANSISTOR
Q3015	2SC1685QRS	TRANSISTOR
Q3200	2SD601ARTX	TRANSISTOR
Q3201	2SD601ARTX	TRANSISTOR
Q3203	2SD601ARTX	TRANSISTOR
Q3206	2SD601ARTX	TRANSISTOR
Q3208	2SB709ARTX	TRANSISTOR
Q3209	2SD601ARTX	TRANSISTOR
Q3210	2SD601ARTX	TRANSISTOR
Q3211	2SD601ARTX	TRANSISTOR
Q3212	2SD601ARTX	TRANSISTOR
Q3220	2SD601ARTX	TRANSISTOR
Q3221	2SD601ARTX	TRANSISTOR
Q3222	2SD601ARTX	TRANSISTOR
Q3223	2SD601ARTX	TRANSISTOR
Q3580	2SB709ARTX	TRANSISTOR
Q3581	2SD601ARTX	TRANSISTOR
Q3582	2SD601ARTX	TRANSISTOR
Q3583	2SD601ARTX	TRANSISTOR
Q3584	2SD601ARTX	TRANSISTOR
Q3585	2SD601ARTX	TRANSISTOR
Q3586	2SD601ARTX	TRANSISTOR
Q4108	2SD601ARTX	TRANSISTOR
Q4109	2SD601ARTX	TRANSISTOR
Q4110	2SD601ARTX	TRANSISTOR
Q4111	2SD601ARTX	TRANSISTOR
Q4131	2SB709ARTX	TRANSISTOR
Q4132	2SD601ARTX	TRANSISTOR
Q4141	2SB709ARTX	TRANSISTOR
Q4142	2SD601ARTX	TRANSISTOR
Q4151	2SB709ARTX	TRANSISTOR
Q4152	2SD601ARTX	TRANSISTOR
Q4154	2SB709ARTX	TRANSISTOR
Q4155	2SD601ARTX	TRANSISTOR
Q4156	2SB709ARTX	TRANSISTOR
Q4251	2SB709ARTX	TRANSISTOR
Q4302	2SD601ARTX	TRANSISTOR
Q4309	2SB709ARTX	TRANSISTOR
Q4310	2SD601ARTX	TRANSISTOR
Q4311	2SB709ARTX	TRANSISTOR
Q4312	2SD601ARTX	TRANSISTOR
Q4313	2SD601ARTX	TRANSISTOR
Q4315	2SC1384QR	TRANSISTOR
Q6501	2SB709ARTX	TRANSISTOR
Q6502	2SD601ARTX	TRANSISTOR
Q6503	2SD601ARTX	TRANSISTOR
Q6504	2SD601ARTX	TRANSISTOR
Q6505	2SD601ARTX	TRANSISTOR
Q6506	2SD601ARTX	TRANSISTOR
Q6507	2SD601ARTX	TRANSISTOR
Q6508	2SB709ARTX	TRANSISTOR
Q6510	2SD601ARTX	TRANSISTOR
Q6511	2SD601ARTX	TRANSISTOR
Q6513	2SD601ARTX	TRANSISTOR
Q6514	2SD601ARTX	TRANSISTOR
Q6515	2SD601ARTX	TRANSISTOR
Q7006	2SD601ARTX	TRANSISTOR
Q7007	2SD601ARTX	TRANSISTOR
Q7031	2SB709ARTX	TRANSISTOR

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
Q7103	2SB709ARTX	TRANSISTOR
Q7104	2SB709ARTX	TRANSISTOR
Q7105	2SB709ARTX	TRANSISTOR
Q7106	2SD601ARTX	TRANSISTOR
Q7107	2SD601ARTX	TRANSISTOR
		RELAYS
RL801	**TSEH8007**	**RELAY**
		RESISTORS
R002	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R003	ERJ6GEYJ221	RES,M 220-J-1/10
R004	ERJ6GEYJ331	RES,M 330-J-1/10
R005	ERJ6GEYJ101	RES,M 100-J-1/10
R006	ERJ6GEYJ473	RES,M 47K-J-1/10
R007	ERJ6GEYJ101	RES,M 100-J-1/10
R014	ERJ6GEYJ103	RES,M 10K-J-1/10
R015	ERJ6GEYJ473	RES,M 47K-J-1/10
R016	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R017	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R019	ERJ6GEYJ151	RES,M 150-J-1/10
R020	ERJ6GEYJ474	RES,M 470K-J-1/10
R021	ERJ6GEYJ101	RES,M 100-J-1/10
R022	ERJ6GEYJ101	RES,M 100-J-1/10
R023	ERJ6GEYJ101	RES,M 100-J-1/10
R025	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R026	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R028	ERJ6GEYJ331	RES,M 330-J-1/10
R029	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R030	ERJ6ENF1002	RES,M 10K-F-1/10
R031	ERJ6GEYJ121	RES,M 120-J-1/10
R032	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R033	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R034	ERJ6GEYJ102	RES,M 1K-J-1/10
R035	ERJ6GEYJ103	RES,M 10K-J-1/10
R036	ERJ6GEYJ103	RES,M 10K-J-1/10
R037	ERJ6GEYJ101	RES,M 100-J-1/10
R038	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R040	ERJ6GEYJ103	RES,M 10K-J-1/10
R041	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R042	ERJ6GEYJ391	RES,M 390-J-1/10
R043	ERJ6GEYJ103	RES,M 10K-J-1/10
R044	ERJ6GEYJ154	RES,M 150K-J-1/10
R045	ERJ6GEYJ684	RES,M 680K-J-1/10
R046	ERJ6GEYJ102	RES,M 1K-J-1/10
R047	ERJ6GEYJ333	RES,M 33K-J-1/10
R048	ERJ6GEYJ221	RES,M 220-J-1/10
R049	ERJ6GEYJ221	RES,M 220-J-1/10
R050	ERJ6GEYJ103	RES,M 10K-J-1/10
R052	ERJ6GEYJ103	RES,M 10K-J-1/10
R053	ERJ6GEYJ101	RES,M 100-J-1/10
R054	ERJ6GEYJ101	RES,M 100-J-1/10
R055	ERJ6GEYJ101	RES,M 100-J-1/10
R056	ERJ6GEYJ101	RES,M 100-J-1/10
R057	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R058	ERJ6GEYJ101	RES,M 100-J-1/10
R059	ERJ6GEYJ392	RES,M 3.9K-J-1/10
R060	ERJ6GEYJ101	RES,M 100-J-1/10
R061	ERJ6GEYJ101	RES,M 100-J-1/10
R062	ERJ6GEYJ123	RES,M 12K-J-1/10
R063	ERJ6GEYJ123	RES,M 12K-J-1/10
R064	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R065	ERJ6GEYJ103	RES,M 10K-J-1/10
R066	ERJ6GEYJ103	RES,M 10K-J-1/10
R067	ERJ6GEYJ103	RES,M 10K-J-1/10
R068	ERJ6GEYJ103	RES,M 10K-J-1/10
R069	ERJ6GEYJ103	RES,M 10K-J-1/10
R070	ERJ6GEYJ102	RES,M 1K-J-1/10
R071	ERJ6GEYJ101	RES,M 100-J-1/10
R072	ERDS2TJ101	RES,C 100-J-1/4
R072	ERDS2TJ222	RES,C 2.2K-J-1/4
R073	ERDS2TJ222	RES,C 2.2K-J-1/4
R073	ERDS2TJ471	RES,C 470-J-1/4
R074	ERDS1FJ473	RES,C 47K-J-1/2W
R075	ERJ6GEYJ103	RES,M 10K-J-1/10
R078	ERDS1FJ473	RES,C 47K-J-1/2W
R080	ERDS2TJ222	RES,C 2.2K-J-1/4
R081	ERDS2TJ222	RES,C 2.2K-J-1/4
R082	ERDS2TJ332	RES,C 3.3K-J-1/4
R083	ERDS2TJ562	RES,C 5.6K-J-1/4
R084	ERDS2TJ103	RES,C 10K-J-1/4
R085	ERDS2TJ223	RES,C 22K-J-1/4
R086	ERDS2TJ101	RES,C 100-J-1/4
R089	ERJ6GEYJ103	RES,M 10K-J-1/10
R093	ERJ6GEYJ101	RES,M 100-J-1/10
R099	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R101	ERJ6GEYJ750	RES,M 75-J-1/10
R102	ERJ6GEYJ683	RES,M 68K-J-1/10
R103	ERJ6GEYJ183	RES,M 18K-J-1/10
R104	ERJ6GEYJ561	RES,M 560-J-1/10
R105	ERJ6GEYJ561	RES,M 560-J-1/10
R107	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R108	ERJ6GEYJ471	RES,M 470-J-1/10
R111	ERJ6GEYJ101	RES,M 100-J-1/10
R152	ERJ6GEYJ183	RES,M 18K-J-1/10
R153	ERJ6GEYJ223	RES,M 22K-J-1/10
R154	ERJ6GEYJ393	RES,M 39K-J-1/10
R201	ERJ6GEYJ221	RES,M 220-J-1/10
R303	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R304	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R305	ERJ6ENF3001	RES,M 3K-F-1/10
R306	ERJ6ENF1431	RES,M 1.43K-F-1/10
R308	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R309	ERJ6GEYJ273	RES,M 27K-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R310	ERJ6GEYJ393	RES,M 39K-J-1/10
R313	ERJ6GEYJ471	RES,M 470-J-1/10
R314	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R317	ERJ6GEYJ224	RES,M 220K-J-1/10
R321	ERJ6GEYJ471	RES,M 470-J-1/10
R322	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R325	ERDS2TJ102	RES,C 1K-J-1/4
R326	ERDS2TJ102	RES,C 1K-J-1/4
R327	ERDS2TJ102	RES,C 1K-J-1/4
R331	ERC12GK102	RES,S 1K-K-1/2
R332	ERC12GK102	RES,S 1K-K-1/2
R333	ERC12GK102	RES,S 1K-K-1/2
R349	ERDS2TJ124	RES,C 120K-J-1/4
R350	ERDS2TJ563	RES,C 56K-J-1/4
R351	ERDS2TJ225	RES,C 2.2MEG-J-1/4
R352	ERDS1TJ823	RES,C 82K-J-1/2
R353	ERDS2TJ334	RES,C 330K-J-1/4
R354	ERDS2TJ122	RES,C 1.2K-J-1/4
R355	ERDS1TJ101	RES,C 100-J-1/2
R356	ERDS2TJ124	RES,C 120K-J-1/4
R358	ERDS2TJ273	RES,C 27K-J-1/4
R359	ERDS2TJ472	RES,C 4.7K-J-1/4
R360	ER0S2CKF3901	RES,M 3.9K-F-1/4
R362	ERC12GK102	RES,S 1K-K-1/2
R363	ERG3SJS562H	RES,M 5.6K-J-3W
R364	ERG3SJS472H	RES,M 4.7K-J-3W
R370	ER0S2CKF3901	RES,M 3.9K-F-1/4
R372	ERC12GK102	RES,S 1K-K-1/2
R373	ERG3SJS562H	RES,M 5.6K-J-3W
R374	ERG3SJS472H	RES,M 4.7K-J-3W
R375	ERDS1TJ101	RES,C 100-J-1/2
R376	ERDS2TJ124	RES,C 120K-J-1/4
R377	ERDS2TJ105	RES,C 1MEG-J-1/4
R378	ERDS2TJ273	RES,C 27K-J-1/4
R379	ERDS2TJ472	RES,C 4.7K-J-1/4
R380	ER0S2CKF3901	RES,M 3.9K-F-1/4
R382	ERC12GK102	RES,S 1K-K-1/2
R383	ERG3SJS562H	RES,M 5.6K-J-3W
R384	ERG3SJS472H	RES,M 4.7K-J-3W
R395	ERDS1TJ101	RES,C 100-J-1/2
R396	ERDS2TJ124	RES,C 120K-J-1/4
R398	ERDS2TJ273	RES,C 27K-J-1/4
R399	ERDS2TJ472	RES,C 4.7K-J-1/4
R401	ERJ6GEYJ102	RES,M 1K-J-1/10
R405	ERJ6GEYJ471	RES,M 470-J-1/10
R406	ERJ6GEYJ102	RES,M 1K-J-1/10
R407	ERJ6GEYJ471	RES,M 470-J-1/10
R408	ERJ6GEYJ102	RES,M 1K-J-1/10
R410	ERJ6GEYJ223	RES,M 22K-J-1/10
R411	ERJ6GEYJ103	RES,M 10K-J-1/10
R412	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R413	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R414	ERJ6GEYJ103	RES,M 10K-J-1/10
R452	ERDS2TJ563	RES,C 56K-J-1/4
R453	ERQ12HJ1R0	RES,F 1.0-J-1/2
R454	ERDS2TJ153	RES,C 15K-J-1/4
R455	ERDS2TJ562	RES,C 5.6K-J-1/4
R456	ERDS2TJ681	RES,C 680-J-1/4
R457	ERDS2TJ153	RES,C 15K-J-1/4
R458	ERDS1FJ391	RES,C 390-J-1/2
R459	ERQ14AJ2R2	RES,F 2.2-J-1/4
R460	ERDS2TJ683	RES,C 68K-J-1/4
R461	ERDS1FJ122	RES,C 1.2K-J-1/2
R462	ERDS2TJ333	RES,C 33K-J-1/4
R463	ERDS2TJ224	RES,C 220K-J-1/4
R465	ERDS2TJ471	RES,C 470-J-1/4
R466	ERDS2TJ153	RES,C 15K-J-1/4
R467	ERDS2TJ564	RES,C 560K-J-1/4
R468	ERDS2TJ332	RES,C 3.3K-J-1/4
R469	ERDS2TJ123	RES,C 12K-J-1/4
R470	ERDS2TJ331	RES,C 330-J-1/4
R471	ERDS2TJ331	RES,C 330-J-1/4
R472	ERDS2TJ331	RES,C 330-J-1/4
R473	ER0S2CKF4701	RES,M 4.7K-F-1/4
R474	ER0S2CKF7151	RES,M 7.15K-F-1/4
R476	ER0S2CKF1431	RES,M 1.43K-F-1/4W
R477	ER0S2CKF1911	RES,M 1.91K-F-1/4W
R478	ER0S2CKF3242	RES,M 32.4K-F-1/4W
R479	ER0S2CKF1502	RES,M 15K-F-1/4
R480	ER0S2CKF1202	RES,M 12K-F-1/4
R481	ERDS2TJ103	RES,C 10K-J-1/4
R483	ERDS2TJ103	RES,C 10K-J-1/4
R484	ERDS2TJ102	RES,C 1K-J-1/4
R487	ERDS2TJ562	RES,C 5.6K-J-1/4
R488	ERDS2TJ184	RES,C 180K-J-1/4
R489	ERDS2TJ102	RES,C 1K-J-1/4
R501	ERJ6GEYJ102	RES,M 1K-J-1/10
R502	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R503	ERJ6GEYJ822	RES,M 8.2K-J-1/10
R504	ERJ6GEYJ101	RES,M 100-J-1/10
R506	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R507	ERJ6GEYJ392	RES,M 3.9K-J-1/10
R508	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R509	ERDS1FJ821	RES,C 820-J-1/2
R521	ERQ3CJ182L	RES,F 1.8K-J-3W
R522	ERG3SJ332	RES,M 3.3K-J-3W
R523	ERDS2TJ471	RES,C 470-J-1/4
R524	ERDS2TJ561	RES,C 560-J-1/4
R540	ERJ6GEYJ101	RES,M 100-J-1/10
R543	ERJ6GEYJ183	RES,M 18K-J-1/10
R552	**ERF5ZK2R2**	**RES,W 2.2-K-5W**
R553	ER0S2CKF1002	RES,M 10K-F-1/4

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R556	ER0S2CKF4752	RES,M 47.5K-F-1/4W
R557	ER0S2CKF3322	RES,M 33.2K-F-1/4W
R560	ERDS2TJ392	RES,C 3.9K-J-1/4
R561	ERDS2TJ222	RES,C 2.2K-J-1/4
R562	ERDS2TJ273	RES,C 27K-J-1/4
R581	ERDS1TJ394	RES,C 390K-J-1/2
R583	**ERQ2CJP1R0**	**RES,F 1.0-J-2W**
R584	**ERQ12HKR33**	**RES,F .33-K-1/2**
R585	ERG1SJ471	RES,M 470-J-1W
R608	ERJ6GEYJ221	RES,M 220-J-1/10
R609	ERJ6GEYJ221	RES,M 220-J-1/10
R610	ERJ6GEYJ221	RES,M 220-J-1/10
R611	ECUX1H181JCX	CAP,C 180PF-J-50V
R612	ECUX1H181JCX	CAP,C 180PF-J-50V
R613	ECUX1H181JCX	CAP,C 180PF-J-50V
R614	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R615	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R616	ERJ6GEYJ102	RES,M 1K-J-1/10
R617	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R618	ERJ6GEYJ223	RES,M 22K-J-1/10
R619	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R620	ERJ6GEYJ471	RES,M 470-J-1/10
R754	ERDS2TJ562	RES,C 5.6K-J-1/4
R755	ERDS2TJ122	RES,C 1.2K-J-1/4
R755	ERDS2TJ562	RES,C 5.6K-J-1/4
R756	ERDS2TJ561	RES,C 560-J-1/4
R757	ERDS2TJ222	RES,C 2.2K-J-1/4
R758	ERQ2CJ270L	RES,F 27-J-2W
R760	ERDS2TJ103	RES,C 10K-J-1/4
R802	**TAR26FJ1R5Z**	**RES,W 1.5-J-15W**
R804	ERDS1TJ104	RES,C 100K-J-1/2
R805	ERDS1TJ104	RES,C 100K-J-1/2
R806	ERDS1TJ104	RES,C 100K-J-1/2
R807	ERDS2TJ472	RES,C 4.7K-J-1/4
R809	ERDS2TJ104	RES,C 100K-J-1/4
R810	**ERX12SJR22**	**RES,M .22-J-1/2**
R811	**ERX12SJR22**	**RES,M .22-J-1/2**
R812	ERDS2TJ103	RES,C 10K-J-1/4
R813	ERDS1FJ471	RES,C 470-J-1/2
R814	ERDS2TJ4R7	RES,C 4.7-J-1/4
R815	ERDS2TJ222	RES,C 2.2K-J-1/4
R816	ERDS2TJ471	RES,C 470-J-1/4
R817	ERDS2TJ152	RES,C 1.5K-J-1/4
R818	ERDS2TJ100	RES,C 10-J-1/4
R819	**ERX12SJR22**	**RES,M .22-J-1/2**
R820	ERDS1FJ470	RES,C 47-J-1/2
R821	ERDS2TJ471	RES,C 470-J-1/4
R822	ERDS2TJ104	RES,C 100K-J-1/4
R823	ERDS2TJ222	RES,C 2.2K-J-1/4
R825	ERDS2TJ152	RES,C 1.5K-J-1/4
R826	ERDS2TJ333	RES,C 33K-J-1/4

REF NO.	PART NO.	DESCRIPTION
R827	ERDS2TJ103	RES,C 10K-J-1/4
R830	**ERC12ZGM825**	**RES,S 8.2MEG-M-1/2**
R832	ERDS2TJ102	RES,C 1K-J-1/4
R835	ERX1SJ1R0	RES,M 1.0-J-1W
R836	ERX1SJ1R0	RES,M 1.0-J-1W
R837	ERDS1FJ122	RES,C 1.2K-J-1/2
R838	ERDS2TJ562	RES,C 5.6K-J-1/4
R839	ERDS2TJ563	RES,C 56K-J-1/4
R840	ERDS2TJ682	RES,C 6.8K-J-1/4
R841	ERX1SJR39	RES,M .39-J-1W
R842	ERDS2TJ102	RES,C 1K-J-1/4
R843	ERDS2TJ222	RES,C 2.2K-J-1/4
R844	ERDS2TJ562	RES,C 5.6K-J-1/4
R845	ERDS2TJ273	RES,C 27K-J-1/4
R846	ERDS2TJ102	RES,C 1K-J-1/4
R847	ERX1SJR39	RES,M .39-J-1W
R848	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R849	ERJ6GEYJ391	RES,M 390-J-1/10
R850	ERJ6GEYJ333	RES,M 33K-J-1/10
R851	ERJ6GEYJ683	RES,M 68K-J-1/10
R852	ERG2SJS823H	RES,M 82K-J-2W
R854	ERDS2TJ561	RES,C 560-J-1/4
R860	ERDS2TJ222	RES,C 2.2K-J-1/4
R861	**ERQ12HKR22**	**RES,F .22-K-1/2**
R880	ERG2SJS150H	RES,M 15-J-2W
R881	ERG2SJS120H	RES,M 12-J-2W
R1023	ERJ6GEYJ102	RES,M 1K-J-1/10
R1029	ERJ6GEYJ102	RES,M 1K-J-1/10
R1051	ERJ6GEYJ102	RES,M 1K-J-1/10
R1110	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R1111	ERJ6GEYJ103	RES,M 10K-J-1/10
R1241	ERJ6GEYJ101	RES,M 100-J-1/10
R1243	ERJ6GEYJ102	RES,M 1K-J-1/10
R1551	ERDS2TJ473	RES,C 47K-J-1/4
R1553	ERDS2TJ123	RES,C 12K-J-1/4
R1554	ER0S2CKF2742	RES,M 27.4K-F-1/4W
R1555	ER0S2CKF2741	RES,M 2.74K-F-1/4
R1556	ERDS2TJ101	RES,C 100-J-1/4
R1557	ER0S2CKF3321	RES,M 3.32K-F-1/4W
R1558	ERDS2TJ101	RES,C 100-J-1/4
R1559	ERDS2TJ221	RES,C 220-J-1/4
R1560	ERDS2TJ221	RES,C 220-J-1/4
R1561	ERDS2TJ182	RES,C 1.8K-J-1/4
R1562	ERDS2TJ104	RES,C 100K-J-1/4
R1563	ERG2SJ823	RES,M 82K-J-2W
R1564	ERG2SJ823	RES,M 82K-J-2W
R1565	ERG2SJ823	RES,M 82K-J-2W
R1566	ERG2SJ823	RES,M 82K-J-2W
R1568	ERC12GK333	RES,S 33K-K-1/2
R1571	ERDS2TJ471	RES,C 470-J-1/4
R1572	ERDS2TJ102	RES,C 1K-J-1/4

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R1574	ERDS2TJ123	RES,C 12K-J-1/4
R1575	ERDS2TJ275	RES,C 2.7MEG-J-1/4W
R1576	ERDS2TJ124	RES,C 120K-J-1/4
R1577	ERDS2TJ333	RES,C 33K-J-1/4
R1578	ERDS2TJ102	RES,C 1K-J-1/4
R1581	**ERQ12HJ330**	**RES,F 33-J-1/2**
R1582	**ER0S2CKF1782**	**RES,M 17.8K-F-1/4W**
R1584	**ER0S2CKF7151**	**RES,M 7.15K-F-1/4**
R1585	ERDS2TJ222	RES,C 2.2K-J-1/4
R1586	ERDS2TJ103	RES,C 10K-J-1/4
R1588	ERDS2TJ222	RES,C 2.2K-J-1/4
R1589	ERDS2TJ472	RES,C 4.7K-J-1/4
R1590	ERDS2TJ562	RES,C 5.6K-J-1/4
R1591	ERJ6GEYJ221	RES,M 220-J-1/10
R1593	ERDS2TJ682	RES,C 6.8K-J-1/4
R1594	ERDS2TJ222	RES,C 2.2K-J-1/4
R1801	ERJ6GEYJ301	RES,M 300-J-1/10
R1802	ERJ6GEYJ104	RES,M 100K-J-1/10
R1803	ERJ6GEYJ474	RES,M 470K-J-1/10
R1804	ERJ6GEYJ202	RES,M 2K-J-1/10
R1805	ERJ6GEYJ102	RES,M 1K-J-1/10
R1807	ERJ6GEYJ103	RES,M 10K-J-1/10
R1808	ERJ6GEYJ103	RES,M 10K-J-1/10
R1809	ERJ6GEYJ473	RES,M 47K-J-1/10
R1810	ERJ6GEYJ103	RES,M 10K-J-1/10
R1811	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R1812	ERJ6GEYJ153	RES,M 15K-J-1/10
R1813	ERJ6GEYJ153	RES,M 15K-J-1/10
R1814	ERJ6GEYJ361	RES,M 360-J-1/10
R1815	ERJ6GEYJ471	RES,M 470-J-1/10
R1818	ERJ6GEYJ101	RES,M 100-J-1/10
R1819	ERJ6GEYJ101	RES,M 100-J-1/10
R1822	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R1823	ERJ6GEYJ473	RES,M 47K-J-1/10
R1825	ERJ6GEYJ471	RES,M 470-J-1/10
R1827	ERJ6GEYJ102	RES,M 1K-J-1/10
R1828	ERJ6GEYJ471	RES,M 470-J-1/10
R1830	ERJ6GEYJ102	RES,M 1K-J-1/10
R1856	ERJ6GEYJ153	RES,M 15K-J-1/10
R1901	ERDS2TJ243	RES,C 24K-J-1/4
R1902	ERDS2TJ683	RES,C 68K-J-1/4
R1903	ERDS2TJ103	RES,C 10K-J-1/4
R1904	ERDS2TJ822	RES,C 8.2K-J-1/4
R1905	ERDS2TJ152	RES,C 1.5K-J-1/4
R1906	ERDS2TJ471	RES,C 470-J-1/4
R1907	ERDS2TJ102	RES,C 1K-J-1/4
R1908	ERDS2TJ821	RES,C 820-J-1/4
R1909	ERDS2TJ133	RES,C 13K-J-1/4
R1910	ERJ6GEYJ473	RES,M 47K-J-1/10
R1911	ERJ6GEYJ273	RES,M 27K-J-1/10
R1912	ERJ6GEYJ103	RES,M 10K-J-1/10
R1913	ERJ6GEYJ823	RES,M 82K-J-1/10
R1914	ERJ6GEYJ223	RES,M 22K-J-1/10
R1915	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R1916	ERJ6GEYJ471	RES,M 470-J-1/10
R1917	ERJ6GEYJ561	RES,M 560-J-1/10
R1918	ERJ6GEYJ102	RES,M 1K-J-1/10
R1919	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R1920	ERJ6GEYJ683	RES,M 68K-J-1/10
R1921	ERJ6GEYJ103	RES,M 10K-J-1/10
R1922	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R1923	ERJ6GEYJ821	RES,M 820-J-1/10
R1924	ERJ6GEYJ471	RES,M 470-J-1/10
R1925	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R1927	ERJ6GEYJ392	RES,M 3.9K-J-1/10
R1931	ERDS2TJ822	RES,C 8.2K-J-1/4
R1932	ERDS2TJ152	RES,C 1.5K-J-1/4
R1940	ERJ6GEYJ473	RES,M 47K-J-1/10
R1941	ERJ6GEYJ223	RES,M 22K-J-1/10
R1942	ERJ6GEYJ822	RES,M 8.2K-J-1/10
R1943	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R1945	ERJ6GEYJ272	RES,M 2.7K-J-1/10
R1949	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R1950	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R2106	ERJ6GEYJ183	RES,M 18K-J-1/10
R2109	ERJ6GEYJ683	RES,M 68K-J-1/10
R2110	ERJ6GEYJ331	RES,M 330-J-1/10
R2111	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R2112	ERJ6GEYJ331	RES,M 330-J-1/10
R2113	ERJ6GEYJ102	RES,M 1K-J-1/10
R2114	ERJ6GEYJ681	RES,M 680-J-1/10
R2116	ERJ6GEYJ102	RES,M 1K-J-1/10
R2117	ERJ6GEYJ121	RES,M 120-J-1/10
R2118	EVND8AA03B14	CONTROL 10K
R2119	ERJ6GEYJ392	RES,M 3.9K-J-1/10
R2121	ERJ6GEYJ221	RES,M 220-J-1/10
R2122	ERJ6GEYJ473	RES,M 47K-J-1/10
R2123	ERJ6GEYJ473	RES,M 47K-J-1/10
R2124	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R2127	ERJ6GEYJ101	RES,M 100-J-1/10
R2201	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R2202	ERJ6GEYJ153	RES,M 15K-J-1/10
R2203	ERJ6GEYJ104	RES,M 100K-J-1/10
R2204	ERJ6GEYJ473	RES,M 47K-J-1/10
R2205	ERJ6GEYJ154	RES,M 150K-J-1/10
R2206	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R2207	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R2208	ERJ6ENF9102	RES,M 91K-F-1/10
R2212	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R2220	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R2221	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R2231	ERJ6GEYJ223	RES,M 22K-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: *Components printed in* **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R2232	ERJ6GEYJ333	RES,M 33K-J-1/10
R2233	ERJ6GEYJ153	RES,M 15K-J-1/10
R2234	ERJ6GEYJ154	RES,M 150K-J-1/10
R2235	ERJ6GEYJ223	RES,M 22K-J-1/10
R2301	ERJ6GEYJ153	RES,M 15K-J-1/10
R2302	ERJ6GEYJ153	RES,M 15K-J-1/10
R2305	ERD25FJ2R2	RES,C 2.2-J-1/4
R2306	ERD25FJ2R2	RES,C 2.2-J-1/4
R2310	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R2311	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R2315	ERJ6GEYJ822	RES,M 8.2K-J-1/10
R2316	ERJ6GEYJ103	RES,M 10K-J-1/10
R2320	ERJ6GEYJ471	RES,M 470-J-1/10
R2321	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R2322	ERJ6GEYJ471	RES,M 470-J-1/10
R2323	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R2331	ERDS2TJ332	RES,C 3.3K-J-1/4
R2332	ERDS2TJ332	RES,C 3.3K-J-1/4
R2333	ERDS2TJ183	RES,C 18K-J-1/4
R2334	ERDS2TJ183	RES,C 18K-J-1/4
R2335	ERDS2TJ472	RES,C 4.7K-J-1/4
R2336	ERDS2TJ472	RES,C 4.7K-J-1/4
R2337	ERDS2TJ103	RES,C 10K-J-1/4
R2338	ERDS2TJ103	RES,C 10K-J-1/4
R2339	ERDS2TJ102	RES,C 1K-J-1/4
R2340	ERDS2TJ102	RES,C 1K-J-1/4
R2341	ERDS2TJ473	RES,C 47K-J-1/4
R2342	ERDS2TJ473	RES,C 47K-J-1/4
R2343	ERDS2TJ102	RES,C 1K-J-1/4
R2344	ERDS2TJ102	RES,C 1K-J-1/4
R2345	ERDS2TJ102	RES,C 1K-J-1/4
R2346	ERDS2TJ102	RES,C 1K-J-1/4
R2347	ERDS2TJ223	RES,C 22K-J-1/4
R2348	ERDS2TJ101	RES,C 100-J-1/4
R2401	ERJ6GEYJ103	RES,M 10K-J-1/10
R2402	ERJ6GEYJ103	RES,M 10K-J-1/10
R2403	ERJ6GEYJ181	RES,M 180-J-1/10
R2405	ERJ6GEYJ560	RES,M 56-J-1/10
R2406	ERJ6GEYJ560	RES,M 56-J-1/10
R2409	ERJ6GEYJ105	RES,M 1.0MEG-J-1/10
R2801	**ERC12ZGM825**	**RES,S 8.2MEG-M-1/2**
R3001	ERJ6GEYJ473	RES,M 47K-J-1/10
R3002	ERJ6GEYJ104	RES,M 100K-J-1/10
R3009	ER0S2CKF82R0	RES,M 82-F-1/4W
R3010	ERDS2TJ184	RES,C 180K-J-1/4
R3011	ERDS2TJ184	RES,C 180K-J-1/4
R3012	ER0S2CKF82R0	RES,M 82-F-1/4W
R3013	ERDS2TJ184	RES,C 180K-J-1/4
R3014	ERDS2TJ184	RES,C 180K-J-1/4
R3015	ER0S2CKF75R0	RES,M 75-F-1/4
R3024	ER0S2CKF75R0	RES,M 75-F-1/4

REF NO.	PART NO.	DESCRIPTION
R3027	ERDS2TJ101	RES,C 100-J-1/4
R3031	ERDS2TJ101	RES,C 100-J-1/4
R3032	ERDS2TJ102	RES,C 1K-J-1/4
R3033	ERDS2TJ102	RES,C 1K-J-1/4
R3034	ERDS2TJ101	RES,C 100-J-1/4
R3035	ERDS2TJ102	RES,C 1K-J-1/4
R3038	ERDS2TJ102	RES,C 1K-J-1/4
R3039	ERDS2TJ101	RES,C 100-J-1/4
R3040	ERDS2TJ683	RES,C 68K-J-1/4
R3042	ERDS2TJ102	RES,C 1K-J-1/4
R3043	ERDS2TJ683	RES,C 68K-J-1/4
R3044	ERDS2TJ223	RES,C 22K-J-1/4
R3045	ERDS2TJ101	RES,C 100-J-1/4
R3047	ERDS2TJ123	RES,C 12K-J-1/4
R3048	ERDS2TJ392	RES,C 3.9K-J-1/4
R3049	ERDS2TJ101	RES,C 100-J-1/4
R3050	ERDS2TJ471	RES,C 470-J-1/4
R3052	ERDS2TJ471	RES,C 470-J-1/4
R3053	ERDS2TJ102	RES,C 1K-J-1/4
R3055	ERDS2TJ102	RES,C 1K-J-1/4
R3056	ERDS2TJ102	RES,C 1K-J-1/4
R3057	ERDS2TJ471	RES,C 470-J-1/4
R3058	ERDS2TJ152	RES,C 1.5K-J-1/4
R3060	ERDS2TJ682	RES,C 6.8K-J-1/4
R3062	ERDS2TJ393	RES,C 39K-J-1/4
R3066	ERDS2TJ102	RES,C 1K-J-1/4
R3067	ERDS2TJ471	RES,C 470-J-1/4
R3068	ERDS2TJ103	RES,C 10K-J-1/4
R3069	ERDS2TJ683	RES,C 68K-J-1/4
R3071	ERDS2TJ102	RES,C 1K-J-1/4
R3076	ERDS2TJ123	RES,C 12K-J-1/4
R3081	ERDS2TJ223	RES,C 22K-J-1/4
R3082	ERDS2TJ223	RES,C 22K-J-1/4
R3087	ERDS2TJ471	RES,C 470-J-1/4
R3088	ERDS2TJ102	RES,C 1K-J-1/4
R3091	ERDS2TJ470	RES,C 47-J-1/4
R3200	ERJ6GEYJ471	RES,M 470-J-1/10
R3201	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3202	ERJ6GEYJ101	RES,M 100-J-1/10
R3203	ERJ6GEYJ471	RES,M 470-J-1/10
R3204	ERJ6GEYJ181	RES,M 180-J-1/10
R3211	ERJ6GEYJ471	RES,M 470-J-1/10
R3212	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3220	ERJ6GEYJ473	RES,M 47K-J-1/10
R3221	ERJ6GEYJ223	RES,M 22K-J-1/10
R3222	ERJ6GEYJ103	RES,M 10K-J-1/10
R3223	ERJ6GEYJ101	RES,M 100-J-1/10
R3230	ERJ6GEYJ102	RES,M 1K-J-1/10
R3231	ERJ6GEYJ681	RES,M 680-J-1/10
R3233	ERJ6GEYJ471	RES,M 470-J-1/10
R3234	ERJ6GEYJ621	RES,M 620-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R3235	ERJ6GEYJ103	RES,M 10K-J-1/10
R3236	ERJ6GEYJ561	RES,M 560-J-1/10
R3237	ERJ6GEYJ561	RES,M 560-J-1/10
R3240	ERJ6GEYJ103	RES,M 10K-J-1/10
R3245	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R3247	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R3248	ERJ6GEYJ182	RES,M 1.8K-J-1/10
R3249	ERJ6GEYJ181	RES,M 180-J-1/10
R3250	ERJ6GEYJ103	RES,M 10K-J-1/10
R3251	ERJ6GEYJ473	RES,M 47K-J-1/10
R3252	ERJ6GEYJ393	RES,M 39K-J-1/10
R3253	ERJ6GEYJ223	RES,M 22K-J-1/10
R3254	ERJ6GEYJ473	RES,M 47K-J-1/10
R3255	ERJ6GEYJ471	RES,M 470-J-1/10
R3256	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3260	ERJ6GEYJ471	RES,M 470-J-1/10
R3261	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3262	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3263	ERJ6GEYJ471	RES,M 470-J-1/10
R3264	ERJ6GEYJ153	RES,M 15K-J-1/10
R3265	ERJ6GEYJ103	RES,M 10K-J-1/10
R3266	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R3267	ERJ6GEYJ683	RES,M 68K-J-1/10
R3268	ERJ6GEYJ563	RES,M 56K-J-1/10
R3269	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R3270	ERJ6GEYJ683	RES,M 68K-J-1/10
R3271	ERJ6GEYJ393	RES,M 39K-J-1/10
R3272	ERJ6GEYJ223	RES,M 22K-J-1/10
R3273	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R3274	ERJ6GEYJ473	RES,M 47K-J-1/10
R3301	ERJ6GEYJ101	RES,M 100-J-1/10
R3302	ERJ6GEYJ101	RES,M 100-J-1/10
R3303	ERJ6GEYJ101	RES,M 100-J-1/10
R3351	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3352	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R3353	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R3419	ERJ6GEYJ101	RES,M 100-J-1/10
R3575	ERJ6GEYJ823	RES,M 82K-J-1/10
R3576	ERJ6GEYJ103	RES,M 10K-J-1/10
R3577	ERJ6GEYJ333	RES,M 33K-J-1/10
R3578	ERJ6GEYJ333	RES,M 33K-J-1/10
R3579	ERJ6GEYJ123	RES,M 12K-J-1/10
R3580	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R3581	ERJ6GEYJ102	RES,M 1K-J-1/10
R3582	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R3583	ERJ6GEYJ102	RES,M 1K-J-1/10
R3584	ERJ6GEYJ471	RES,M 470-J-1/10
R3585	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R3586	ERJ6GEYJ123	RES,M 12K-J-1/10
R3587	ERJ6GEYJ822	RES,M 8.2K-J-1/10
R3588	ERJ6GEYJ681	RES,M 680-J-1/10

REF NO.	PART NO.	DESCRIPTION
R3593	ERJ6GEYJ102	RES,M 1K-J-1/10
R3594	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R3595	ERJ6GEYJ471	RES,M 470-J-1/10
R3596	ERJ6GEYJ153	RES,M 15K-J-1/10
R3597	ERJ6GEYJ103	RES,M 10K-J-1/10
R4109	ERJ6GEYJ223	RES,M 22K-J-1/10
R4110	ERJ6GEYJ223	RES,M 22K-J-1/10
R4111	ERJ6GEYJ223	RES,M 22K-J-1/10
R4114	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R4115	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R4116	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R4117	ERJ6GEYJ223	RES,M 22K-J-1/10
R4118	ERJ6GEYJ223	RES,M 22K-J-1/10
R4119	ERJ6GEYJ101	RES,M 100-J-1/10
R4120	ERJ6GEYJ102	RES,M 1K-J-1/10
R4121	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R4122	ERJ6GEYJ473	RES,M 47K-J-1/10
R4124	ERJ6GEYJ223	RES,M 22K-J-1/10
R4125	ERJ6GEYJ223	RES,M 22K-J-1/10
R4126	ERJ6GEYJ223	RES,M 22K-J-1/10
R4127	ERJ6GEYJ223	RES,M 22K-J-1/10
R4131	ERJ6GEYJ471	RES,M 470-J-1/10
R4132	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R4133	ERJ6GEYJ221	RES,M 220-J-1/10
R4134	ERJ6GEYJ301	RES,M 300-J-1/10
R4135	ERJ6ENF1801	RES,M 1.8K-F-1/10W
R4136	ERJ6GEYJ680	RES,M 68-J-1/10
R4138	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R4139	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R4140	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R4141	ERJ6GEYJ471	RES,M 470-J-1/10
R4142	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R4143	ERJ6GEYJ221	RES,M 220-J-1/10
R4144	ERJ6GEYJ301	RES,M 300-J-1/10
R4145	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R4146	ERJ6GEYJ680	RES,M 68-J-1/10
R4151	ERJ6GEYJ471	RES,M 470-J-1/10
R4152	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R4153	ERJ6GEYJ221	RES,M 220-J-1/10
R4154	ERJ6GEYJ391	RES,M 390-J-1/10
R4155	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R4156	ERJ6GEYJ680	RES,M 68-J-1/10
R4158	ERJ6GEYJ101	RES,M 100-J-1/10
R4162	ERJ6GEYJ101	RES,M 100-J-1/10
R4165	ERJ6GEYJ221	RES,M 220-J-1/10
R4166	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R4167	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R4168	ERJ6GEYJ151	RES,M 150-J-1/10
R4170	ERJ6ENF1201	RES,M 1.2K-F-1/10
R4195	ERJ6GEYJ151	RES,M 150-J-1/10
R4218	ERJ6GEYJ301	RES,M 300-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R4244	ERJ6GEYJ151	RES,M 150-J-1/10
R4246	ERJ6GEYJ151	RES,M 150-J-1/10
R4250	ERJ6GEYJ563	RES,M 56K-J-1/10
R4251	ERJ6GEYJ102	RES,M 1K-J-1/10
R4253	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R4301	ERJ6GEYJ101	RES,M 100-J-1/10
R4308	ERJ6GEYJ104	RES,M 100K-J-1/10
R4309	ERJ6GEYJ103	RES,M 10K-J-1/10
R4326	ERJ6GEYJ471	RES,M 470-J-1/10
R4327	ERJ6GEYJ102	RES,M 1K-J-1/10
R4328	ERJ6GEYJ560	RES,M 56-J-1/10
R4329	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R4330	ERJ6GEYJ561	RES,M 560-J-1/10
R4331	ERJ6GEYJ471	RES,M 470-J-1/10
R4332	ERJ6GEYJ393	RES,M 39K-J-1/10
R4333	ERJ6GEYJ334	RES,M 330K-J-1/10
R4334	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R4336	ERJ6GEYJ680	RES,M 68-J-1/10
R4337	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R4338	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R4339	ERJ6GEYJ102	RES,M 1K-J-1/10
R4340	ERJ6GEYJ223	RES,M 22K-J-1/10
R4342	ERJ6GEYJ223	RES,M 22K-J-1/10
R4343	ERJ6GEYJ101	RES,M 100-J-1/10
R4344	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R4345	ERJ6GEYJ103	RES,M 10K-J-1/10
R6501	ERJ6GEYJ272	RES,M 2.7K-J-1/10
R6502	ERJ6GEYJ221	RES,M 220-J-1/10
R6503	ERJ6GEYJ102	RES,M 1K-J-1/10
R6504	ERJ6GEYJ471	RES,M 470-J-1/10
R6505	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R6506	ERJ6GEYJ471	RES,M 470-J-1/10
R6509	ERJ6GEYJ123	RES,M 12K-J-1/10
R6511	ERJ6GEYJ821	RES,M 820-J-1/10
R6512	ERJ6GEYJ271	RES,M 270-J-1/10
R6513	ERJ6GEYJ510	RES,M 51-J-1/10
R6514	ERJ6GEYJ101	RES,M 100-J-1/10
R6515	ERJ6GEYJ433	RES,M 43K-J-1/10
R6516	ERJ6GEYJ224	RES,M 220K-J-1/10
R6518	ERJ6GEYJ123	RES,M 12K-J-1/10
R6519	ERJ6GEYJ103	RES,M 10K-J-1/10
R6520	ERJ6GEYJ272	RES,M 2.7K-J-1/10
R6522	ERJ6GEYJ102	RES,M 1K-J-1/10
R6524	ERJ6GEYJ471	RES,M 470-J-1/10
R6525	ERJ6GEYJ102	RES,M 1K-J-1/10
R6526	ERJ6GEYJ471	RES,M 470-J-1/10
R6527	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R6528	ERJ6GEYJ333	RES,M 33K-J-1/10
R6530	ERJ6GEYJ473	RES,M 47K-J-1/10
R6531	ERJ6GEYJ153	RES,M 15K-J-1/10
R6532	ERJ6GEYJ821	RES,M 820-J-1/10

REF NO.	PART NO.	DESCRIPTION
R6533	ERJ6GEYJ102	RES,M 1K-J-1/10
R6534	ERJ6GEYJ471	RES,M 470-J-1/10
R6535	ERJ6GEYJ471	RES,M 470-J-1/10
R6536	ERJ6GEYJ221	RES,M 220-J-1/10
R6539	ERJ6GEYJ333	RES,M 33K-J-1/10
R6540	ERJ6GEYJ103	RES,M 10K-J-1/10
R6541	ERJ6GEYJ681	RES,M 680-J-1/10
R6542	ERJ6GEYJ391	RES,M 390-J-1/10
R6546	ERJ6GEYJ183	RES,M 18K-J-1/10
R6547	ERJ6GEYJ122	RES,M 1.2K-J-1/10
R6548	ERJ6GEYJ102	RES,M 1K-J-1/10
R6553	ERJ6GEYJ333	RES,M 33K-J-1/10
R6557	ERJ6GEYJ202	RES,M 2K-J-1/10
R6559	ERJ6GEYJ151	RES,M 150-J-1/10
R6560	ERJ6GEYJ471	RES,M 470-J-1/10
R6561	ERJ6GEYJ272	RES,M 2.7K-J-1/10
R6562	ERJ6GEYJ221	RES,M 220-J-1/10
R6563	ERJ6GEYJ102	RES,M 1K-J-1/10
R6564	ERJ6GEYJ102	RES,M 1K-J-1/10
R6565	ERJ6GEYJ102	RES,M 1K-J-1/10
R6566	ERJ6GEYJ471	RES,M 470-J-1/10
R7007	ERJ6GEYJ273	RES,M 27K-J-1/10
R7008	ERJ6GEYJ273	RES,M 27K-J-1/10
R7009	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R7010	ERJ6GEYJ472	RES,M 4.7K-J-1/10
R7011	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7012	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7013	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7014	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7015	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7016	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7018	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R7019	ERJ6GEYJ102	RES,M 1K-J-1/10
R7020	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R7021	ERJ6GEYJ102	RES,M 1K-J-1/10
R7022	ERJ6GEYJ562	RES,M 5.6K-J-1/10
R7023	ERJ6GEYJ102	RES,M 1K-J-1/10
R7025	ERX2SJ5R6	RES,M 5.6-J-2W
R7030	ERX2SJ3R3	RES,M 3.3-J-2W
R7035	ERX2SJ5R6	RES,M 5.6-J-2W
R7040	ERX2SJ3R3	RES,M 3.3-J-2W
R7045	ERX2SJ5R6	RES,M 5.6-J-2W
R7050	ERX2SJ3R3	RES,M 3.3-J-2W
R7051	ERDS1TJ271	RES,C 270-J-1/2
R7052	ERDS1TJ271	RES,C 270-J-1/2
R7053	ERDS1TJ271	RES,C 270-J-1/2
R7054	ERDS1TJ271	RES,C 270-J-1/2
R7055	ERDS1TJ271	RES,C 270-J-1/2
R7056	ERDS1TJ271	RES,C 270-J-1/2
R7061	ERJ6GEYJ152	RES,M 1.5K-J-1/10
R7062	ERJ6GEYJ471	RES,M 470-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R7107	ERJ6GEYJ331	RES,M 330-J-1/10
R7108	ERJ6GEYJ331	RES,M 330-J-1/10
R7109	ERJ6GEYJ331	RES,M 330-J-1/10
R7112	ERJ6GEYJ331	RES,M 330-J-1/10
R7113	ERJ6GEYJ331	RES,M 330-J-1/10
R7116	ERJ6GEYJ331	RES,M 330-J-1/10
R7117	ERJ6GEYJ221	RES,M 220-J-1/10
R7118	ERJ6GEYJ101	RES,M 100-J-1/10
R7119	ERJ6GEYJ101	RES,M 100-J-1/10
R7120	ERJ6GEYJ331	RES,M 330-J-1/10
R7127	ERJ6GEYJ103	RES,M 10K-J-1/10
R7130	ERJ6GEYJ103	RES,M 10K-J-1/10
R7131	ERJ6GEYJ103	RES,M 10K-J-1/10
R7132	ERJ6GEYJ103	RES,M 10K-J-1/10
R7133	ERJ6GEYJ684	RES,M 680K-J-1/10
R7136	ERJ6GEYJ103	RES,M 10K-J-1/10
R7139	ERJ6GEYJ103	RES,M 10K-J-1/10
R7140	ERJ6GEYJ221	RES,M 220-J-1/10
R7142	ERJ6GEYJ103	RES,M 10K-J-1/10
R7143	ERJ6GEYJ392	RES,M 3.9K-J-1/10
R7148	ERJ6GEYJ103	RES,M 10K-J-1/10
R7149	ERJ6GEYJ103	RES,M 10K-J-1/10
R7150	ERJ6GEYJ272	RES,M 2.7K-J-1/10
R7151	ERJ6GEYJ682	RES,M 6.8K-J-1/10
R7152	ERJ6GEYJ103	RES,M 10K-J-1/10
R7153	ERJ6GEYJ103	RES,M 10K-J-1/10
R7154	ERJ6GEYJ103	RES,M 10K-J-1/10
R7155	ERJ6GEYJ103	RES,M 10K-J-1/10
R7156	ERJ6GEYJ103	RES,M 10K-J-1/10
R7157	ERJ6GEYJ103	RES,M 10K-J-1/10
R7158	ERJ6GEYJ103	RES,M 10K-J-1/10
R7159	ERJ6GEYJ103	RES,M 10K-J-1/10
R7160	ERJ6GEYJ103	RES,M 10K-J-1/10
R7161	ERJ6GEYJ103	RES,M 10K-J-1/10
R7162	ERJ6GEYJ103	RES,M 10K-J-1/10
R7163	ERJ6GEYJ103	RES,M 10K-J-1/10
R7164	ERJ6GEYJ103	RES,M 10K-J-1/10
R7165	ERJ6GEYJ103	RES,M 10K-J-1/10
R7166	ERJ6GEYJ103	RES,M 10K-J-1/10
R7169	ERJ6GEYJ102	RES,M 1K-J-1/10
R7172	ERJ6GEYJ103	RES,M 10K-J-1/10
R7173	ERJ6GEYJ103	RES,M 10K-J-1/10
R7175	ERJ6GEYJ103	RES,M 10K-J-1/10
R7177	ERJ6GEYJ103	RES,M 10K-J-1/10
R7180	ERJ6GEYJ153	RES,M 15K-J-1/10
R7181	ERJ6GEYJ153	RES,M 15K-J-1/10
R7184	ERJ6GEYJ103	RES,M 10K-J-1/10
R7186	ERJ6GEYJ103	RES,M 10K-J-1/10
R7188	ERJ6GEYJ103	RES,M 10K-J-1/10
R7189	ERJ6GEYJ103	RES,M 10K-J-1/10
R7190	ERJ6GEYJ103	RES,M 10K-J-1/10
R7191	ERJ6GEYJ103	RES,M 10K-J-1/10
R7192	ERJ6GEYJ103	RES,M 10K-J-1/10
R7193	ERJ6GEYJ103	RES,M 10K-J-1/10
R7194	ERJ6GEYJ473	RES,M 47K-J-1/10
R7195	ERJ6GEYJ103	RES,M 10K-J-1/10
R7196	ERJ6GEYJ103	RES,M 10K-J-1/10
R7197	ERJ6GEYJ103	RES,M 10K-J-1/10
R7198	ERJ6GEYJ103	RES,M 10K-J-1/10
R7201	ERJ6GEYJ103	RES,M 10K-J-1/10
R7204	ERJ6GEYJ103	RES,M 10K-J-1/10
R7205	ERJ6GEYJ103	RES,M 10K-J-1/10
R7207	ERJ6GEYJ103	RES,M 10K-J-1/10
R7208	ERJ6GEYJ103	RES,M 10K-J-1/10
R7211	ERJ6GEYJ103	RES,M 10K-J-1/10
R7212	ERJ6GEYJ103	RES,M 10K-J-1/10
R7213	ERJ6GEYJ103	RES,M 10K-J-1/10
R7215	ERJ6GEYJ103	RES,M 10K-J-1/10
R7216	ERJ6GEYJ103	RES,M 10K-J-1/10
R7217	ERJ6GEYJ103	RES,M 10K-J-1/10
R7218	ERJ6GEYJ103	RES,M 10K-J-1/10
R7219	ERJ6GEYJ103	RES,M 10K-J-1/10
R7220	ERJ6GEYJ103	RES,M 10K-J-1/10
R7221	ERJ6GEYJ103	RES,M 10K-J-1/10
R7222	ERJ6GEYJ102	RES,M 1K-J-1/10
R7223	ERJ6GEYJ103	RES,M 10K-J-1/10
R7224	ERJ6GEYJ103	RES,M 10K-J-1/10
R7225	ERJ6GEYJ103	RES,M 10K-J-1/10
R7226	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R7227	ERJ6GEYJ102	RES,M 1K-J-1/10
R7228	ERJ6GEYJ103	RES,M 10K-J-1/10
R7229	ERJ6GEYJ103	RES,M 10K-J-1/10
R7230	ERJ6GEYJ103	RES,M 10K-J-1/10
R7231	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R7232	ERJ6GEYJ103	RES,M 10K-J-1/10
R7233	ERJ6GEYJ102	RES,M 1K-J-1/10
R7234	ERJ6GEYJ103	RES,M 10K-J-1/10
R7235	ERJ6GEYJ103	RES,M 10K-J-1/10
R7236	ERJ6GEYJ222	RES,M 2.2K-J-1/10
R7237	ERJ6GEYJ103	RES,M 10K-J-1/10
R7238	ERJ6GEYJ103	RES,M 10K-J-1/10
R7239	ERJ6GEYJ103	RES,M 10K-J-1/10
R7240	ERJ6GEYJ103	RES,M 10K-J-1/10
R7241	ERJ6GEYJ332	RES,M 3.3K-J-1/10
R7242	ERJ6GEYJ103	RES,M 10K-J-1/10
R7243	ERJ6GEYJ103	RES,M 10K-J-1/10
R7244	ERJ6GEYJ103	RES,M 10K-J-1/10
R7245	ERJ6GEYJ103	RES,M 10K-J-1/10
R7247	ERJ6GEYJ221	RES,M 220-J-1/10
R7248	ERJ6GEYJ221	RES,M 220-J-1/10
R7249	ERJ6GEYJ221	RES,M 220-J-1/10
R7250	ERJ6GEYJ221	RES,M 220-J-1/10

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

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REF NO.	PART NO.	DESCRIPTION
R7251	ERJ6GEYJ391	RES,M 390-J-1/10
R7252	ERJ6GEYJ103	RES,M 10K-J-1/10
R7253	ERJ6GEYJ223	RES,M 22K-J-1/10
R7254	ERJ6GEYJ223	RES,M 22K-J-1/10
R7255	ERJ6GEYJ103	RES,M 10K-J-1/10
R7256	ERJ6GEYJ223	RES,M 22K-J-1/10
R7257	ERJ6GEYJ223	RES,M 22K-J-1/10
R7258	ERJ6GEYJ103	RES,M 10K-J-1/10
R7259	ERJ6GEYJ103	RES,M 10K-J-1/10
R7260	ERJ6GEYJ103	RES,M 10K-J-1/10
R7261	ERJ6GEYJ103	RES,M 10K-J-1/10
R7262	ERJ6GEYJ223	RES,M 22K-J-1/10
R7263	ERJ6GEYJ223	RES,M 22K-J-1/10
R7264	ERJ6GEYJ104	RES,M 100K-J-1/10
R7265	ERJ6GEYJ104	RES,M 100K-J-1/10
R7266	ERJ6GEYJ104	RES,M 100K-J-1/10
R7267	ERJ6GEYJ104	RES,M 100K-J-1/10
R7268	ERJ6GEYJ104	RES,M 100K-J-1/10
R7269	ERJ6GEYJ104	RES,M 100K-J-1/10
R7270	ERJ6ENF2702	RES,M 27K-F-1/10
R7272	ERJ6ENF2702	RES,M 27K-F-1/10
R7273	ERJ6ENF2702	RES,M 27K-F-1/10
R7276	ERJ6ENF3902	RES,M 39K-F-1/10
R7277	ERJ6ENF3902	RES,M 39K-F-1/10
R7278	ERJ6ENF3902	RES,M 39K-F-1/10
R7280	ERJ6GEYJ103	RES,M 10K-J-1/10
R7281	ERJ6GEYJ103	RES,M 10K-J-1/10
R7282	ERJ6GEYJ103	RES,M 10K-J-1/10
R7283	ERJ6ENF4702	RES,M 47K-F-1/10
R7284	ERJ6ENF4702	RES,M 47K-F-1/10
R7285	ERJ6ENF4702	RES,M 47K-F-1/10
R7290	ERJ6ENF4702	RES,M 47K-F-1/10
R7292	ERJ6ENF4702	RES,M 47K-F-1/10
R7294	ERJ6ENF4702	RES,M 47K-F-1/10
R7295	ERJ6GEYJ103	RES,M 10K-J-1/10
R7296	ERJ6GEYJ103	RES,M 10K-J-1/10
R7297	ERJ6GEYJ103	RES,M 10K-J-1/10
R7298	ERJ6ENF1001	RES,M 1K-F-1/10
R7299	ERJ6ENF3902	RES,M 39K-F-1/10
R7300	ERJ6ENF3902	RES,M 39K-F-1/10
R7301	ERJ6ENF3902	RES,M 39K-F-1/10
R7304	ERJ6ENF2702	RES,M 27K-F-1/10
R7305	ERJ6ENF2702	RES,M 27K-F-1/10
R7306	ERJ6ENF2702	RES,M 27K-F-1/10
R7308	ERJ6ENF1001	RES,M 1K-F-1/10
R7309	ERJ6ENF1001	RES,M 1K-F-1/10
R7310	ERJ6ENF1001	RES,M 1K-F-1/10
R7311	ERJ6ENF1001	RES,M 1K-F-1/10
R7312	ERJ6ENF1001	RES,M 1K-F-1/10
R7319	ERJ6GEYJ221	RES,M 220-J-1/10
R7320	ERJ6GEYJ221	RES,M 220-J-1/10

REF NO.	PART NO.	DESCRIPTION
R7321	ERJ6GEYJ221	RES,M 220-J-1/10
R7322	ERJ6GEYJ221	RES,M 220-J-1/10
R7326	ERJ6GEYJ103	RES,M 10K-J-1/10
R7340	ERJ6GEYJ105	RES,M 1.0MEG-J-1/10
R7341	ERJ6GEYJ102	RES,M 1K-J-1/10
R7345	ERJ6GEYJ221	RES,M 220-J-1/10
R7346	ERJ6GEYJ221	RES,M 220-J-1/10
R7347	ERJ6GEYJ471	RES,M 470-J-1/10
R7348	ERJ6GEYJ102	RES,M 1K-J-1/10
R7349	ERJ6GEYJ103	RES,M 10K-J-1/10
R7350	ERJ6GEYJ103	RES,M 10K-J-1/10
R7352	ERJ6GEYJ102	RES,M 1K-J-1/10
R7353	ERJ6GEYJ122	RES,M 1.2K-J-1/10
SWITCHES		
S010	EVQQVC13T	SWITCH
S011	EVQQVC13T	SWITCH
S012	EVQQVC13T	SWITCH
S013	EVQQVC13T	SWITCH
S014	EVQQVC13T	SWITCH
S015	EVQQVC13T	SWITCH
S016	EVQQVC13T	SWITCH
TRANSFORMERS		
T501	ETH19Y70AYM	TRANSFORMER, HORIZONTAL DRIVER
T551	**KFT7AQ051F**	**TRANSFORMER, FLYBACK**
T802	**ETS42AD365AC**	**TRANSFORMER**
T2801A	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
CRYSTALS/FILTERS		
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	M1969M	SAW FILTER
X102	EFCWS4504AB	FILTER 4.5MHZ
X201	SFSH4R5MDB	CRYSTAL
X501	TAFCSB503F38	CRYSTAL, CLOCK
X601	TSS2AA001	CRYSTAL, 3.58MHZ
X1801	TSSA050	CRYSTAL OSCILLATOR
X2102	EFCWS4504AB	FILTER 4.5MHZ
X2103	EFCKM1958M	CERAMIC FILTER
X7101	EF0EC4004T4	CRYSTAL
OTHERS		
M001	EASG12P525A2	SPEAKER
M002	ENPE625A	ANT SPLITTER (2 TUNER)
TNR001	**ENV56D19G3**	**TUNER**
TNR002	**ENV56D19G3**	**TUNER**
RM002	RPM-637CBRL	IR RECEIVER, REMOTE CONTROL
M003	EUR511110	REMOTE CONTROL *PT-51G44A/CA*
M004	EUR511171B	REMOTE CONTROL *PT-51G54A/CA PT-51G64A/CA*
M005	UR51EC883A	BATT. COVER, REMOTE CONTROL *PT-51G44A/CA*
M006	UR51EC892A	BATT. COVER, REMOTE CONTROL *PT-51G54A/CA PT-5164A/CA*
DY	**KDY2AS631F**	**YOKE, DEFLECTION**

REPLACEMENT PARTS LIST

Models: PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
M007	TBL2AH30031	CASTER
M008	TBL2A3106	CASTER
M009	TBM2AA0011	BADGE, PANASONIC
M010	TBX2A50191G	ASSY, 7 PUSHBUTTON
M011	TESA024	SPRING
M012	TES6183	RETAINER V OUT IC
M013	**TJS1A5160**	**CRT SOCKET**
M014	TKB2AA0101M	CABINET WOOD *PT-51G44A/CA PT-51G54A/CA*
M015	TKB2AA0111M	CABINET WOOD *PT-61G54A/CA*
M016	TKD2AX0171	BARRIER PANEL *PT-51G44A/CA PT-51G54A/CA*
M017	TXJTU108RC	ASSY CABLE
M018	TKGF5005	LENS, PTV
M019	TKG2AA50051	MIRROR GLASS *PT-51G44A/CA PT-51G54A/CA*
M020	TKG2AA50061	MIRROR GLASS *PT-61G54A/CA*
M021	TKG2AH50201	SCREEN, LENTICULAR *PT-51G44A/CA*
M022	TKG2AH50211	SCREEN, FRESNEL *PT-51G44A/CA*
M023	TKG2AH50221	SCREEN, LENTICULAR *PT-61G54A/CA*
M024	TKG2AH50231	SCREEN, FRESNEL *PT-61G54A/CA*
M025	TKU2AA00901	BACK COVER (LOWER) *PT-51G44A/CA PT-51G54A/CA*
M026	TKU2AA01011	BACK COVER (UPPER) *PT-51G44A/CA PT-51G54A/CA*
M027	TKU2AA01101	BACK COVER (LOWER) *PT-61G54A/CA*
M028	TKU2AA01201	BACK COVER (UPPER) *PT-61G54A/CA*
M029	TNX2A1001	FOCUS BLOCK
M030	TQB2AA0304	MANUAL, OWNERS *PT-51G44A*
M031	TQB2AA0305	MANUAL, OWNERS *PT-51G44CA*
M032	TQB2AA0306	MANUAL, OWNERS *PT-51G54A PT-61G54A*
M033	TQB2AA0307	MANUAL, OWNERS *PT-51G54CA PT-61G54CA*
M034	TQB2AA7034	V-CHIP INSTRUCTIONS
M035	TQB2AA7038	REMOTE GUIDE *PT-51G54A/CA PT-61G54A/CA*
M036	TQB2AA7045	REMOTE GUIDE *PT-51G44A/CA*
M037	**TSX2AA0131**	**LINE CORD**
M038	TXFKG0198SER	ASSY, SCREEN FRAME *PT-51G44A/CA PT-51G54A/CA*
M039	TXFKG0298SER	ASSY, SCREEN FRAME *PT-61G54A/CA*
M040	TXFKP01CAZM	ASSY, SPEAKER GRILLE *PT-51G44A/CA PT-51G54A/CA*
M041	TXFKP017WFM	ASSY, SPEAKER GRILLE *PT-61G54A/CA*
M042	**TXFCRT70SER**	**ASSY, CRT (BLUE)**
M043	**TXFCRT71SER**	**ASSY, CRT (GREEN)**
M044	**TXFCRT72SER**	**ASSY, CRT (RED)**
M045	TXF3A01AAZ	ASSY DAG GND
JK3001	TJB2A10021	TERMINAL BACK A/V

A-Board Schematic
(Left Portion)

PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Sheet 1 of 5
Side A

MTC9903012C1

Voltage Measurements

1. Voltage measurement [illegible] Voltage readings are nominal AC input to the Receiver is 120V and may vary ± 10% depending NTSC, HD (1125I & 525P when devices. Some voltage applicable) signal generator is reading will vary with signal connected to the antenna of the strength and picture content. Receiver (Color bar pattern of 2. Ground symbol ▽ indicates 100 IRE white and 7.5 IRE black) supply voltages are nominal All Picture and Audio adjustments ground lead connection of meter are set to Normalize. Incorrect ground connection will TV ANT CABLE - Set Up Menu result in erroneous readings. TV/ANT Mode CAUTION: Incorrect ground Volume - Min connection of the test equipment TV/Video SW - TV position will result in erroneous readings. Audio Mode - Stereo

Schematic Notes

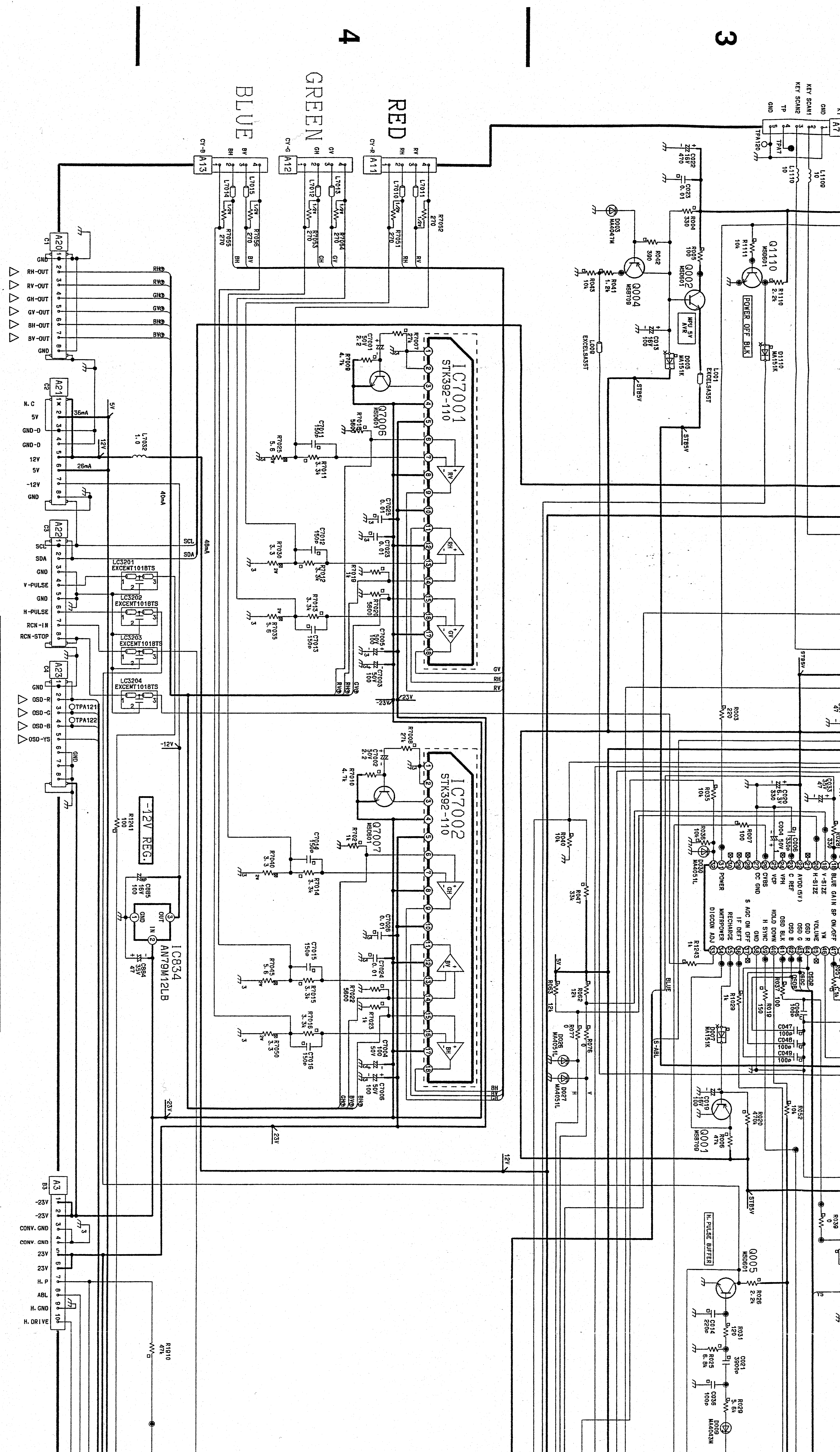
1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in μH.
4. Test point indicated by ● Test point but no pin ○
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ━ BOLD LINE indicates the route of B+ supply.
7. The schematic diagrams are the latest at the time of printing and are subject to change without notice.
8. Ground symbol ▽ indicates HOT GROUND CONNECTION. ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

Waveform Measurements

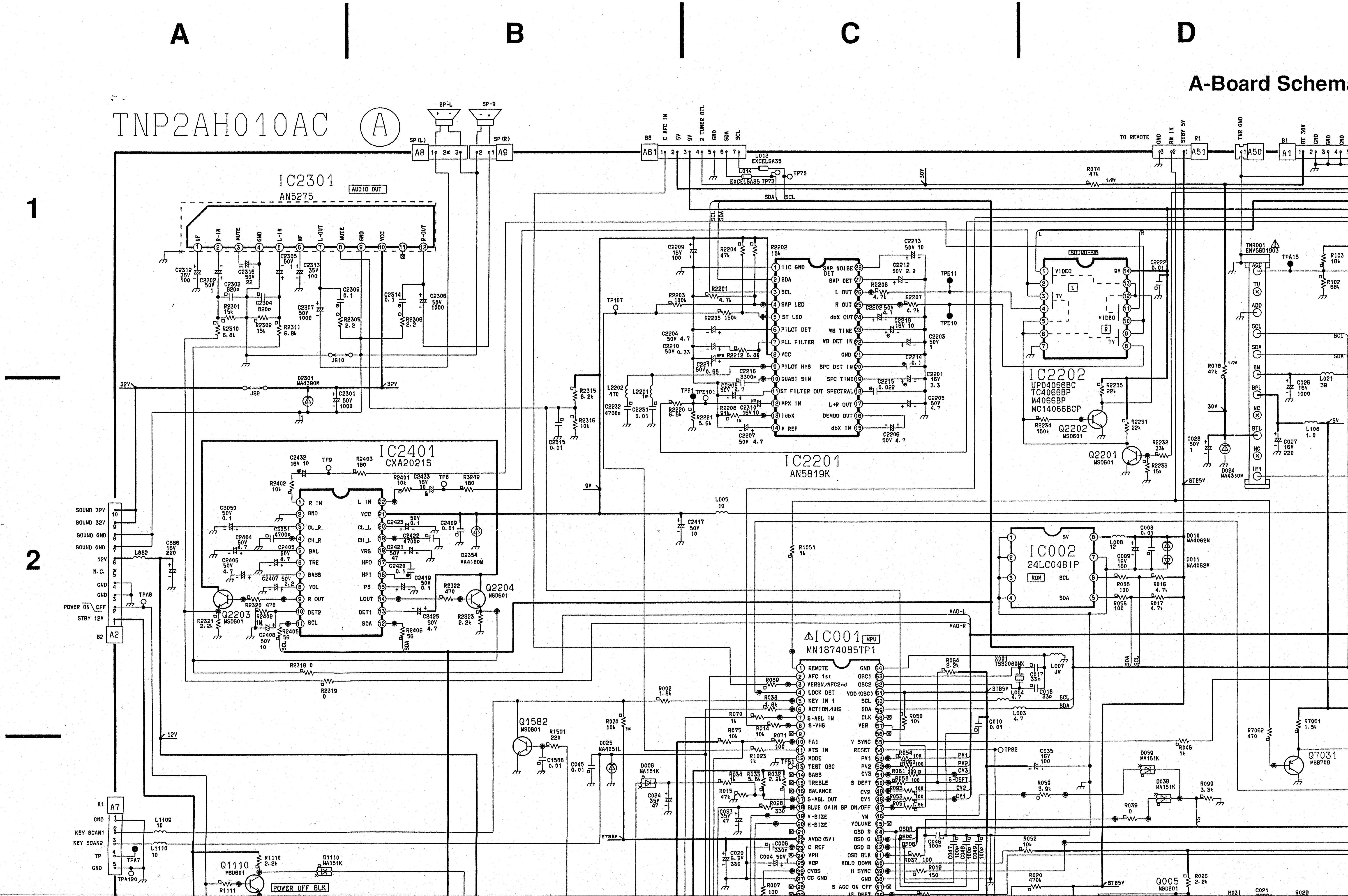
1. ③ Indicates waveform measurement. Measurement can be taken at the best accessible location in common to the indicated point.
2. Taken with an NTSC signal generator connected to the antenna terminal (NTSC color bar pattern of 8 bars of EIA colors 100 IRE white and 7.5 IRE black).
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to MIN.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10:1). Shape and peak amplitudes may vary depending on the type of

5. Ground symbol ▽ indicates ground lead connection of oscilloscope. CAUTION: Incorrect connection of the test equipment result in erroneous readin



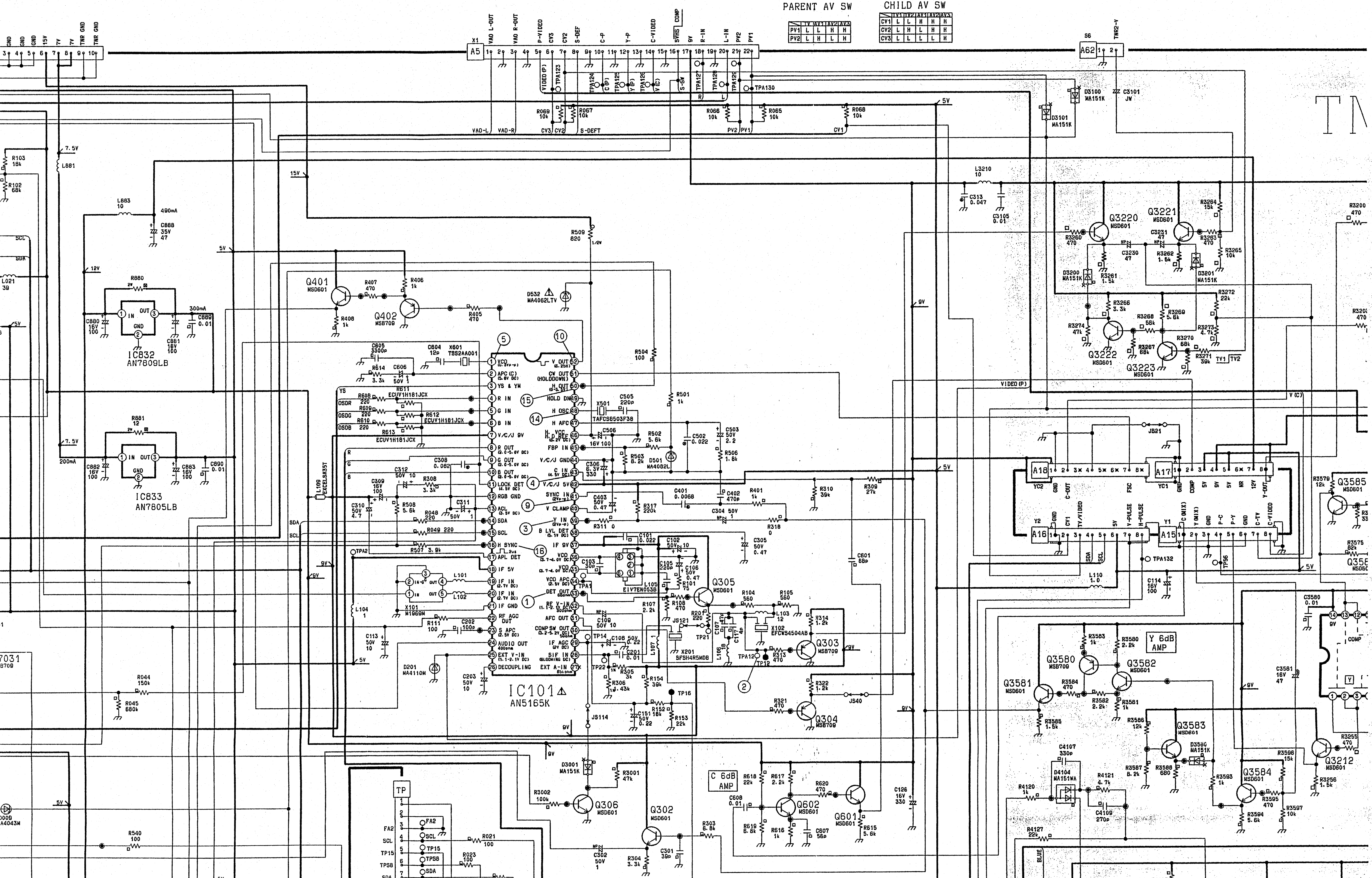
5
4
3
BLUE
GREEN
RED
A20
A21
A22
A23
A3
A11
A12
A13
A7
RH-OUT
RV-OUT
GH-OUT
GV-OUT
BH-OUT
BV-OUT
GND
N.C
5V
GND-D
12V
-12V
SCL
SDA
V-PULSE
H-PULSE
RCN-IN
RCN-STOP
OSD-R
OSD-G
OSD-B
OSD-YS
TPA121
TPA122
LC3201 EXCENT101BTS
LC3202 EXCENT101BTS
LC3203 EXCENT101BTS
LC3204 EXCENT101BTS
-12V REG.
IC834 AN79M12LB
IC7001 STK392-110
IC7002 STK392-110
Q7006 MSD601
Q7007 MSD601
-23V
23V
CONV. GND
H.P
ABL
H.GND
H.DRIVE
Q1110 MSD601
POWER OFF BLK
Q002 MSD601
Q004 MSB709
MPU 5V AVR
ST85V
L001 EXCELSA35T
L008 EXCELSA35T
Q001 MSB709
Q005 MSD601
H.PULSE BUFFER
KEY SCAN1
KEY SCAN2
TP
TPA120
TPA7

A-Board Schema


A
B
C
D
1
2
TNP2AH010AC
A
SP-L
SP-R
SP(L)
SP(R)
A8
A9
A61
S8
C AFC IN
5V
9V
2 TUNER BTL
GND
SDA
SCL
L013 EXCELSA35
L014
EXCELSA35 TP73
TP75
30V
R074 47k 1/2W
TO REMOTE
GND
RM IN
STBY 5V
R1
A51
TNR GND
A50
B1
BT 30V
A1
IC2301
AN5275
AUDIO OUT
NF
R-IN
MUTE
GND
L-IN
NF
L-OUT
MUTE
GND
VCC
R-OUT
C2312 35V 100
C2302 50V 1
C2303 820p
C2316 50V 22
C2304 820p
C2305 50V 1000
C2313 35V 100
C2307 50V 1000
C2309 0.1
C2314 0.1
C2306 50V 1000
R2301 15k
R2302 15k
R2311 6.8k
R2310 6.8k
R2305 2.2
R2306 2.2
JS10
32V
JS9
D2301 MA4390M
C2301 50V 1000
IC2201
AN5819K
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
TP107
TPE1
TPE101
TPE10
TPE11
C2209 16V 100
R2204 47k
R2202 15k
C2213 50V 10
C2212 50V 2.2
R2206 4.7k
R2207 4.7k
C2202 50V 4.7
C2219 16V 10
C2203 50V 1
C2214 0.1
C2201 16V 3.3
C2215 0.022
C2205 50V 4.7
C2206 50V 4.7
C2207 50V 4.7
R2201 4.7k
R2203 100k
R2205 150k
C2204 50V 4.7
C2210 50V 0.33
C2211 50V 0.68
R2212 6.8k
C2216 3300p
C2208 50V 4.7
C2310 16V 10
R2208 91k
R2220 6.8k
R2221 5.6k
L2202 470
L2201 1m
C2232 4700p
C2231 0.01
R2315 8.2k
R2316 10k
C2315 0.01
IC2202
SOUND-SW
VIDEO
9V
TV
L
R
UPD4066BC
TC4066BP
M4066BP
MC14066BCP
C2222 0.01
R2235 22k
R2234 150k
Q2202 MSD601
R2231 22k
Q2201 MSD601
R2232 33k
R2233 15k
TNR001 ENV56D19G3
TPA15
AGC
TU
ADD
SCL
SDA
BM
BPL
NC
BTL
NC
IF1
R103 18k
R102 68k
R078 47k 1/2W
C026 16V 1000
L021 39
L108 1.0
C027 16V 220
C028 50V 1
D024 MA4330M
STB5V
IC2401
CXA2021S
R IN
GND
CL_R
CH_R
BAL
TRE
BASS
VOL
R OUT
DET2
SCL
L IN
VCC
CL_L
CH_L
VRS
HPO
HPI
PS
LOUT
DET1
SDA
C2432 16V 10
TP9
R2403 180
R2401 10k
C2433 16V 10
TP8
R3249 180
R2402 10k
C3050 50V 0.1
C3051 4700p
C2404 50V 4.7
C2405 50V 4.7
C2406 50V 4.7
C2407 50V 2.2
C2423 50V 0.1
C2409 0.01
C2422 4700p
C2421 50V 47
C2420 0.1
C2419 50V 0.1
D2354 MA4180M
R2322 470
Q2204 MSD601
R2323 2.2k
C2425 50V 4.7
R2406 56
Q2203 MSD601
R2320 470
R2321 2.2k
R2409 1M
C2408 50V 10
R2405 56
L005 10
C2417 50V 10
R1051 1k
SOUND 32V
SOUND 32V
SOUND GND
SOUND GND
12V
N.C.
GND
GND
POWER ON/OFF
STBY 12V
A2
B2
L882
C886 16V 220
TPA6
R2318 0
R2319 0
IC002
24LC04BIP
ROM
SCL
SDA
5V
L008 12
C008 0.01
C009 16V 100
D010 MA4062M
D011 MA4062M
R055 100
R056 100
R018 4.7k
R017 4.7k
VAD-L
VAD-R
IC001
MPU
MN1874085TP1
REMOTE
AFC 1st
VERSN/AFC2nd
LOCK DET
KEY IN 1
ACTION/HHS
S-ABL IN
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
S-ABL OUT
BLUE GAIN SP ON/OFF
V-SIZE
H-SIZE
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
S AGC ON OFF
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
VER
V SYNC
RESET
PY1
PY2
CV3
S DEFT
CV2
CV1
YM
VOLUME
OSD R
OSD G
OSD B
OSD BLK
HOLD DOWN
H SYNC
GND
IE DEFT
R064 2.2k
X001 TSS2080MX
C017 33p
C018 33p
L007 JW
L004 4.7
L003 4.7
R050 10k
C010 0.01
TPS2
R089
R038
R002 1.8k
R070 1k
R075 10k
R014 10k
R071 100
R1023 1k
TPS1
R034
R033 5.6k
R032 2.2k
R015 47k
R028 330
C033 35V 47
C006 330p
C004 50V
C020 6.3V 330
R007 100
R054 100
R060 100
R051 100
R058 100
R093 100
R053 100
R057 1.5k
R037 100
R019 150
C046 100p
C047 100p
C048 100p
C049 100p
OSDR
OSDG
OSDB
R052 10k
R020 470k
C035 16V 100
R059 3.9k
Q1582 MSD601
R1591 220
C1588 0.01
C045 0.01
R030 10k
D025 MA4051L
D008 MA151K
C034 35V 47
Q005 MSD601
R026 2.2k
R031
C021
R029
D059 MA151K
D039 MA151K
R039 0
R046 1k
R099 3.3k
R7062 470
R7061 1.5k
Q7031 MSB709
K1
A7
GND
KEY SCAN1
KEY SCAN2
TP
GND
L1109 10
L1110 10
TPA7
TPA120
Q1110 MSD601
R1110 2.2k
R1111
D1110 MA151K
POWER OFF BLK

E F G H

ematic (Left Portion)


X1
A5
VAO L-OUT
VAO R-OUT
P-VIDEO
CV3
CV2
S-DEF
C-P
Y-P
C-VIDEO
SVHS COMP
9V
R-IN
L-IN
PV2
PV1
TPA130
S6
A62
TNR2-Y
D3100 MA151K
D3101 MA151K
IC832 AN7809LB
IC833 AN7805LB
IC101 AN5165K
Q401 MSD601
Q402 MSB709
Q305 MSD601
Q303 MSB709
Q304 MSB709
Q306 MSD601
Q302 MSD601
Q602 MSD601
Q601 MSD601
C 6dB AMP
Y 6dB AMP
Q3220 MSD601
Q3221 MSD601
Q3222 MSD601
Q3223 MSD601
Q3580 MSB709
Q3581 MSD601
Q3582 MSD601
Q3583 MSD601
Q3584 MSD601
Q3585 MSD601
Q3212 MSD601
A16
A17
A18
A15
TP
FA2
SCL
TP15
TPS8
SDA
VIDEO(P)
V(C)
TV1
TV2

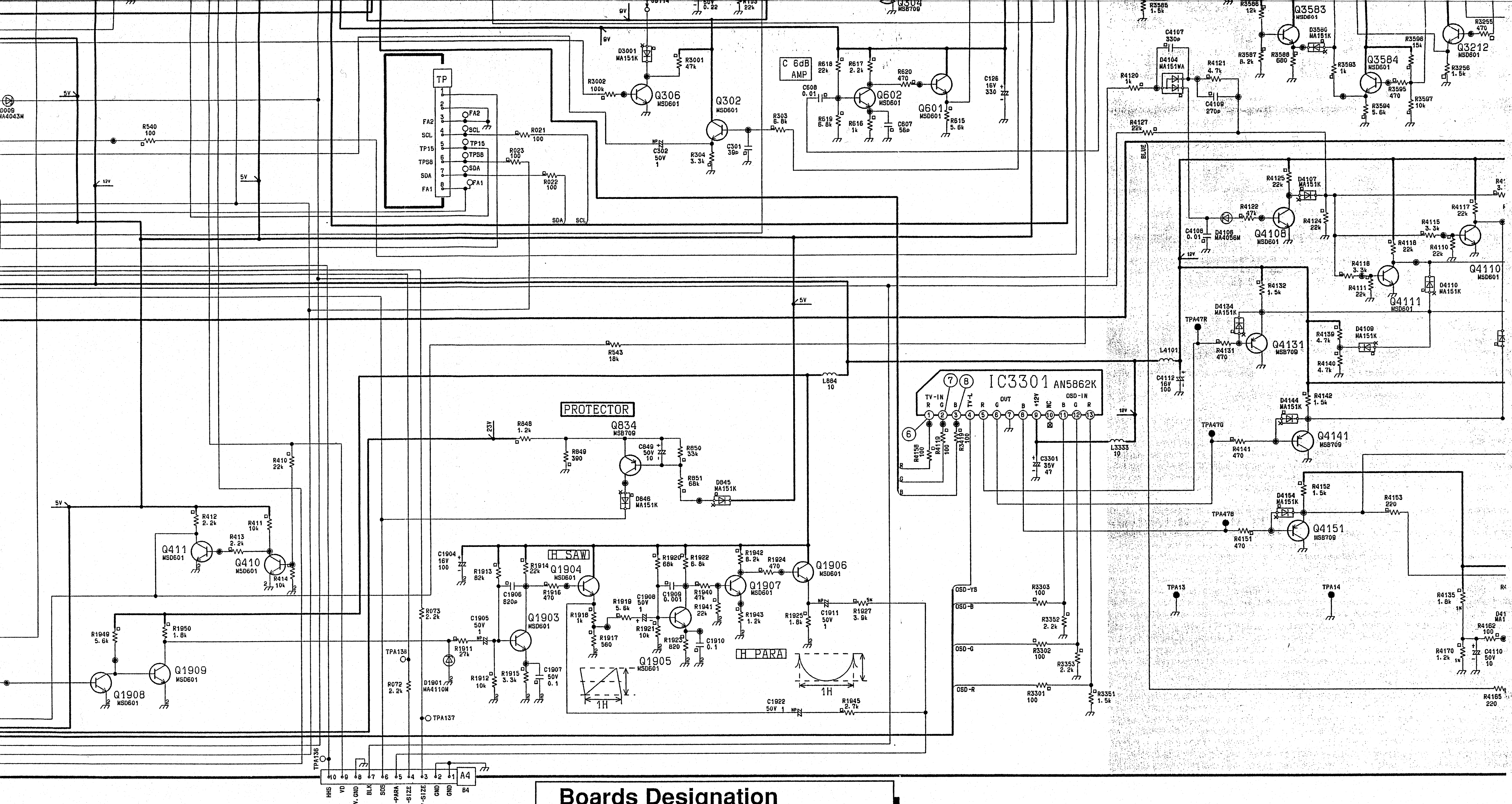
PARENT AV SW

	TV	AV1	AV2	AV3
PV1	L	L	H	H
PV2	L	H	L	H

CHILD AV SW

	TV1	TV2	AV1	AV2	AV3
CV1	L	L	H	H	H
CV2	L	H	L	H	H
CV3	L	L	L	L	H

Overlapping Section
Side A for Right Portion of Schematic


TP
FA2
SCL
TP15
TPS8
SDA
FA1
R540 100
R021 100
R023 100
R022 100
SDA
SCL
D3001 MA151K
R3001 47k
R3002 100k
Q306 MSD601
Q302 MSD601
C302 50V 1
R304 3.3k
C301 39p
R303 6.8k
C 6dB AMP
C608 0.01
R618 22k
R617 2.2k
R620 470
Q602 MSD601
Q601 MSD601
R619 6.8k
R616 1k
C607 56p
R615 5.6k
C126 16V 330
Q3583 MSD601
Q3584 MSD601
Q3212 MSD601
C4107 330p
D4104 MA151WA
R4120 1k
R4121 4.7k
C4109 270p
R4127 22k
BLUE
R4125 22k
D4107 MA151K
R4122 47k
Q4108 MSD601
C4106 0.01
D4106 MA4056M
R4124 22k
R4117 22k
R4115 3.3k
R4118 22k
R4110 22k
Q4110 MSD601
R4116 3.3k
R4111 22k
Q4111 MSD601
D4110 MA151K
R4132 1.5k
D4134 MA151K
TPA47R
R4131 470
Q4131 MSB709
R4139 4.7k
D4109 MA151K
R4140 4.7k
L4101
C4112 16V 100
R543 18k
L884 10
IC3301 AN5862K
TV-IN
OUT
OSD-IN
R G B TV-L R G B +12V NC B G R
R4158 100
R4159 100
R3410 100
C3301 35V 47
L3333 10
R4142 1.5k
D4144 MA151K
TPA47G
Q4141 MSB709
R4141 470
R4152 1.5k
D4154 MA151K
TPA47B
Q4151 MSB709
R4151 470
R4153 220
PROTECTOR
Q834 MSB709
R848 1.2k
R849 390
C849 50V 10
R850 33k
R851 68k
D845 MA151K
D846 MA151K
R410 22k
R412 2.2k
R411 10k
R413 2.2k
Q411 MSD601
Q410 MSD601
R414 10k
H SAW
C1904 16V 100
R1913 82k
R1914 22k
Q1904 MSD601
C1906 820p
R1916 470
R1918 1k
R1917 560
R1919 5.6k
C1908 50V 1
R1920 68k
R1922 6.8k
C1909 0.001
R1940 47k
R1941 22k
R1942 8.2k
R1924 470
Q1907 MSD601
Q1906 MSD601
R1943 1.2k
R1921 10k
R1923 820
C1910 0.1
Q1905 MSD601
R1925 1.8k
C1911 50V 1
R1927 3.9k
H PARA
1H
1H
C1922 50V 1
R1945 2.7k
R1949 5.6k
R1950 1.8k
Q1908 MSD601
Q1909 MSD601
C1905 50V 1
R1911 27k
Q1903 MSD601
R1912 10k
R1915 3.3k
C1907 50V 0.1
D1901 MA4110M
R073 2.2k
R072 2.2k
TPA138
TPA137
TPA136
OSD-YS
OSD-B
OSD-G
OSD-R
R3303 100
R3352 2.2k
R3302 100
R3353 2.2k
R3301 100
R3351 1.5k
TPA13
TPA14
R4135 1.8k
R4162 100
R4170 1.2k
C4110 50V 10
R4165 220
5V
9V
12V
23V
A4
B4
HHS
VD
V.GND
BLK
SOS
H-PARA
H-SIZE
V-SIZE
GND
GND

Overlapping Section
See Sheet 2 Side A for Right Portion o

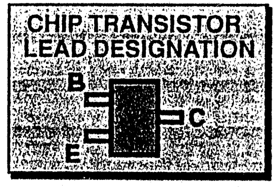
...ol shown on
...ber indicates (Hot)
connection of the
...ncorrect ... ground
test equipment will
...s readings

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

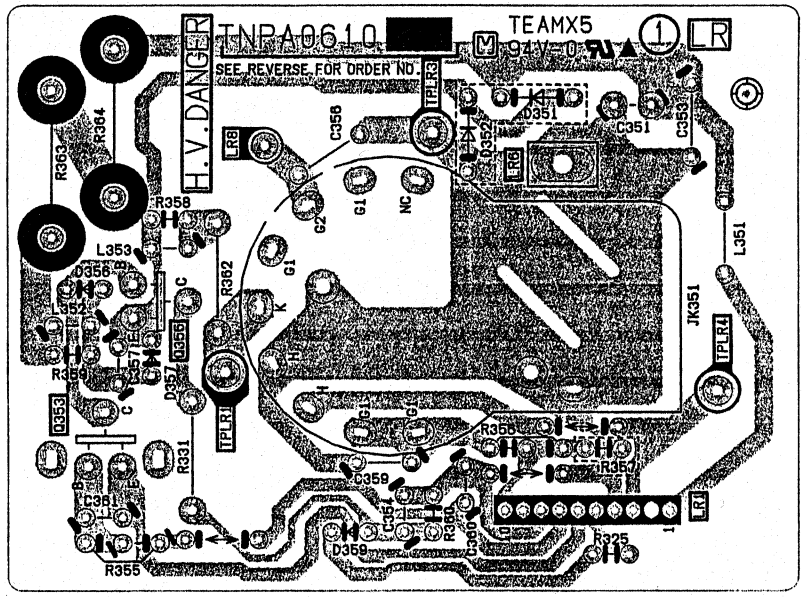
Boards Designation

- A-Board - Main Chassis
- B-Board - Power Supply
- C-Board - Convergence
- D-Board - Protection Circuit
- K-Board - Customer Controls
- LB/LG/LR-Board - Blue, Green & Red CRT Boards
- R-Board - Remote Sensor
- S-Board - 2nd Tuner
- T-Board - Line Filter
- X-Board - AV Inputs
- Y-Board - PIP Processing
- YC-Board - Digital 3-line Comb Filter

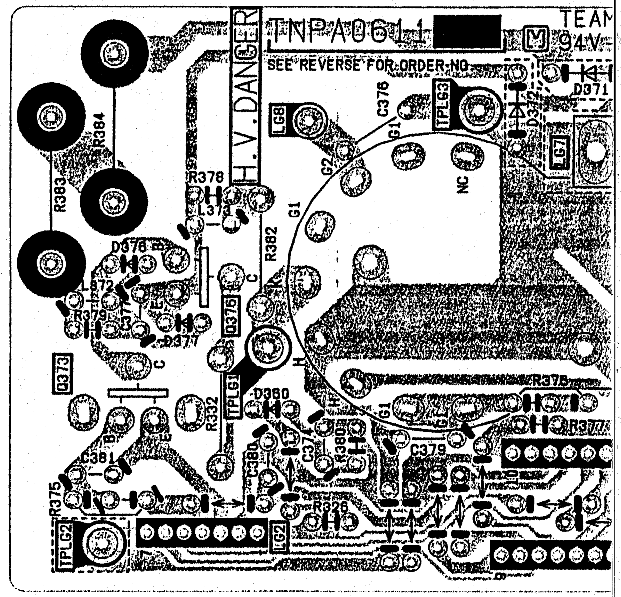

CHIP TRANSISTOR
LEAD DESIGNATION
B
C
E

1

LR-Board (TNPA0610)

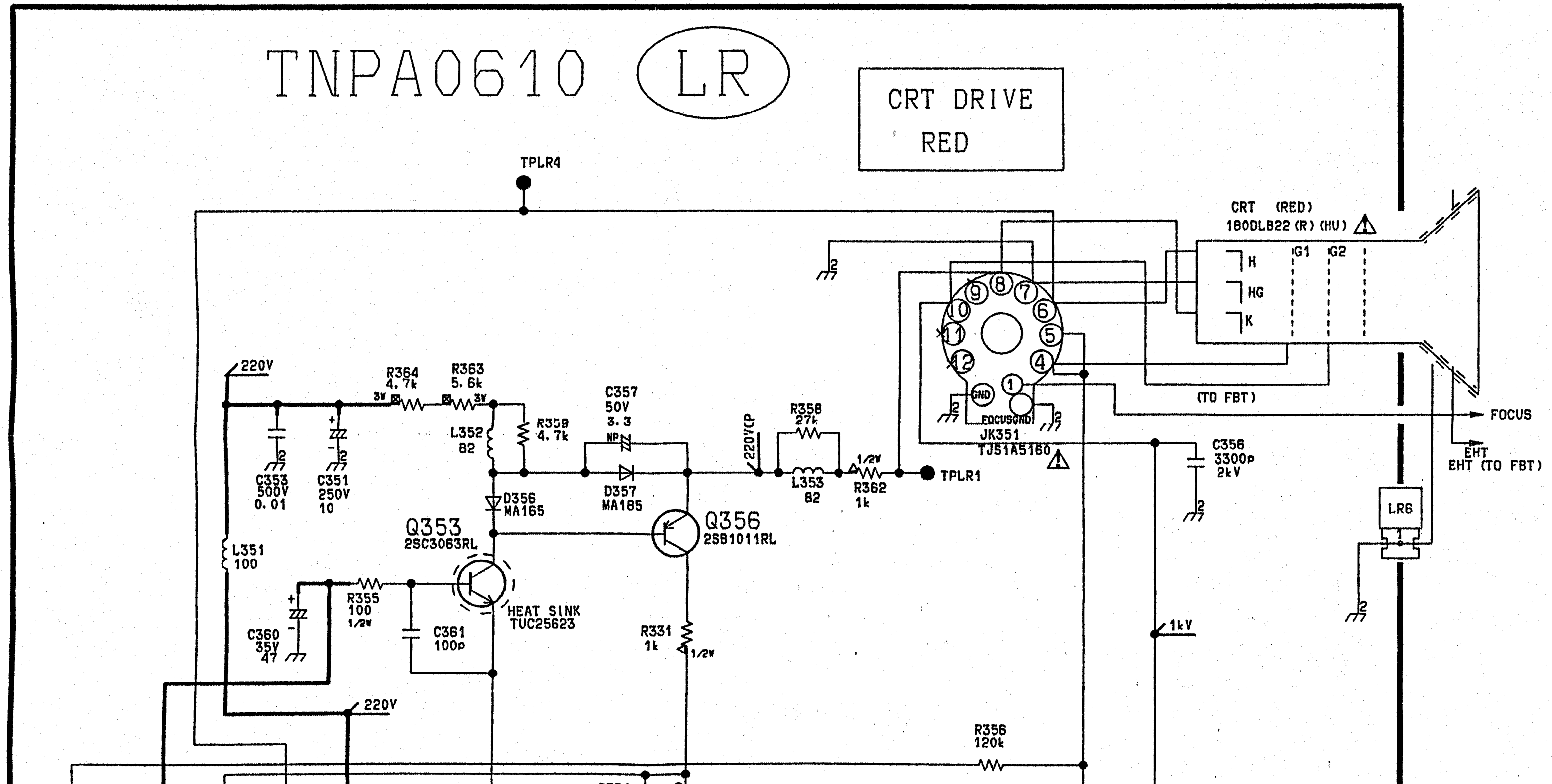

TNPA0610
TEAMX5
94V-0
LR
H.V. DANGER
SEE REVERSE FOR ORDER NO.
R363
R364
R358
L353
D356
Q353
Q356
R362
TPLR1
TPLR3
TPLR4
C356
C351
C353
D351
L351
JK351
G1
G2
NC
R331
C359
R355
C361
R356
D359
C360
R325
LR6

LG-Board (TNPA061


TNPA0611
TEAM
94V
H.V. DANGER
SEE REVERSE FOR ORDER NO.
R383
R384
R378
R382
D376
D377
D371
C376
Q373
Q376
TPLG3
TPLG2
R375
C381
D380
C379
R379
NC
G1
G2

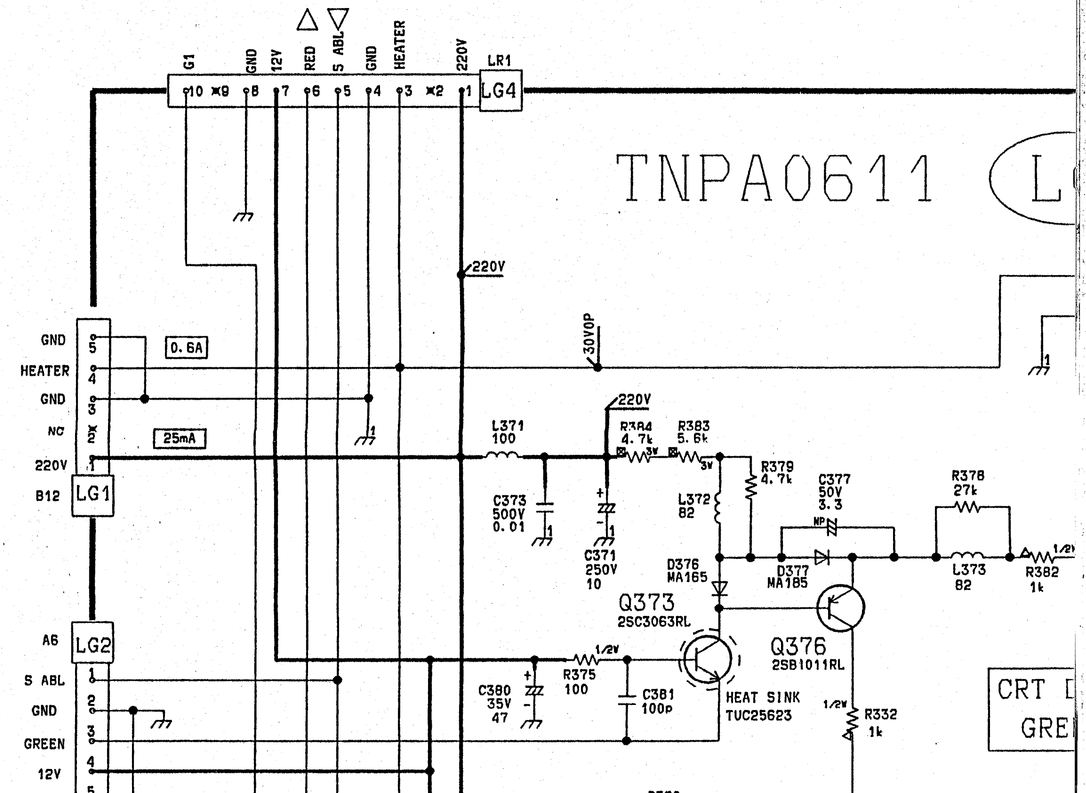
2

LR-Board Schematic

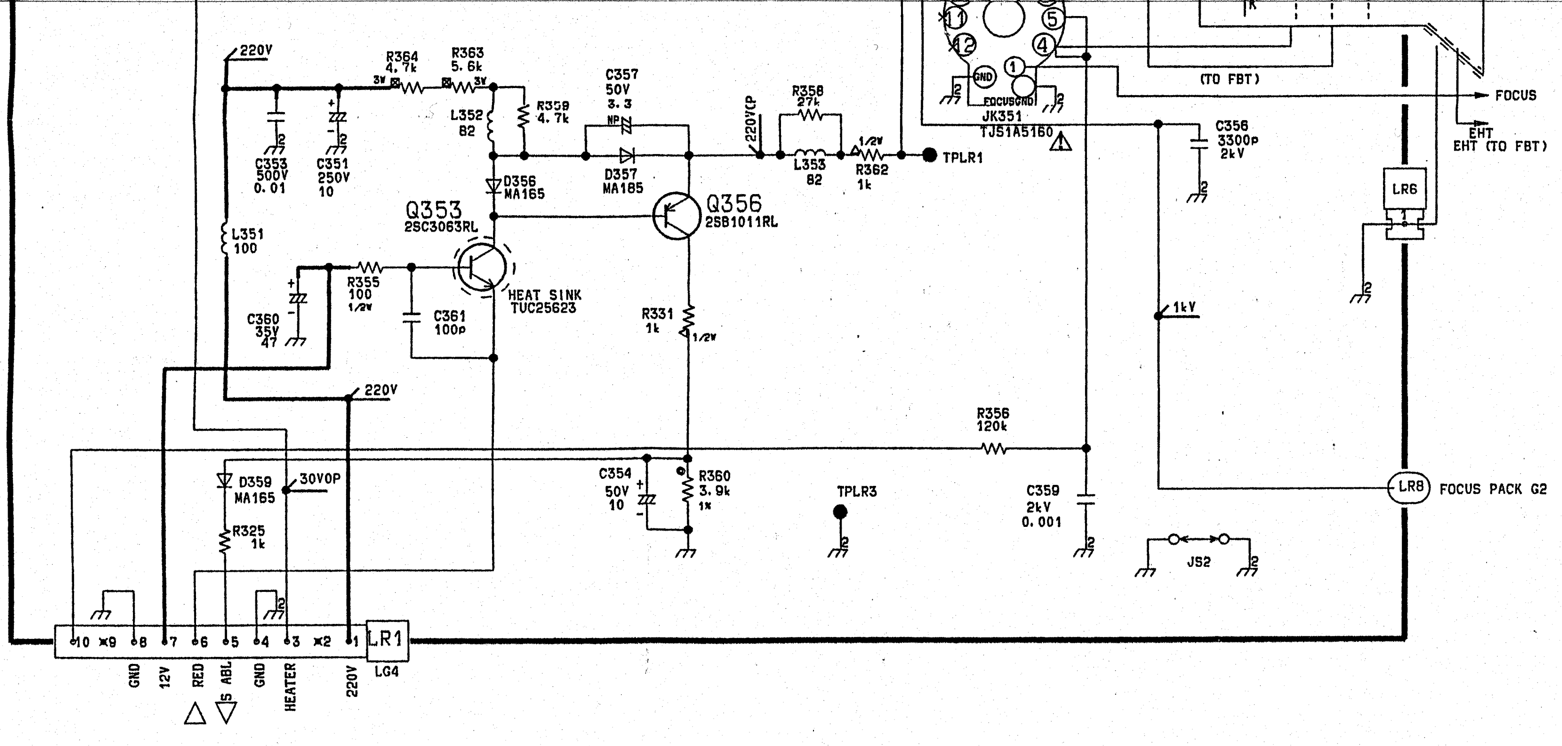

TNPA0610
LR
CRT DRIVE
RED
TPLR4
CRT (RED)
180DL822 (R) (HV)
H
HG
K
G1
G2
(TO FBT)
FOCUS
EHT
EHT (TO FBT)
220V
R364
4.7k
R363
5.6k
R359
4.7k
C357
50V
3.3
L352
82
D356
MA165
D357
MA185
Q353
2SC3063RL
Q356
2SB1011RL
HEAT SINK
TUC25623
R358
27k
L353
82
R362
1k
1/2W
TPLR1
JK351
TJS1A5160
C356
3300p
2kV
LR6
C353
500V
0.01
C351
250V
10
L351
100
C360
35V
47
R355
100
C361
100p
R331
1k
1kV
R356
120k

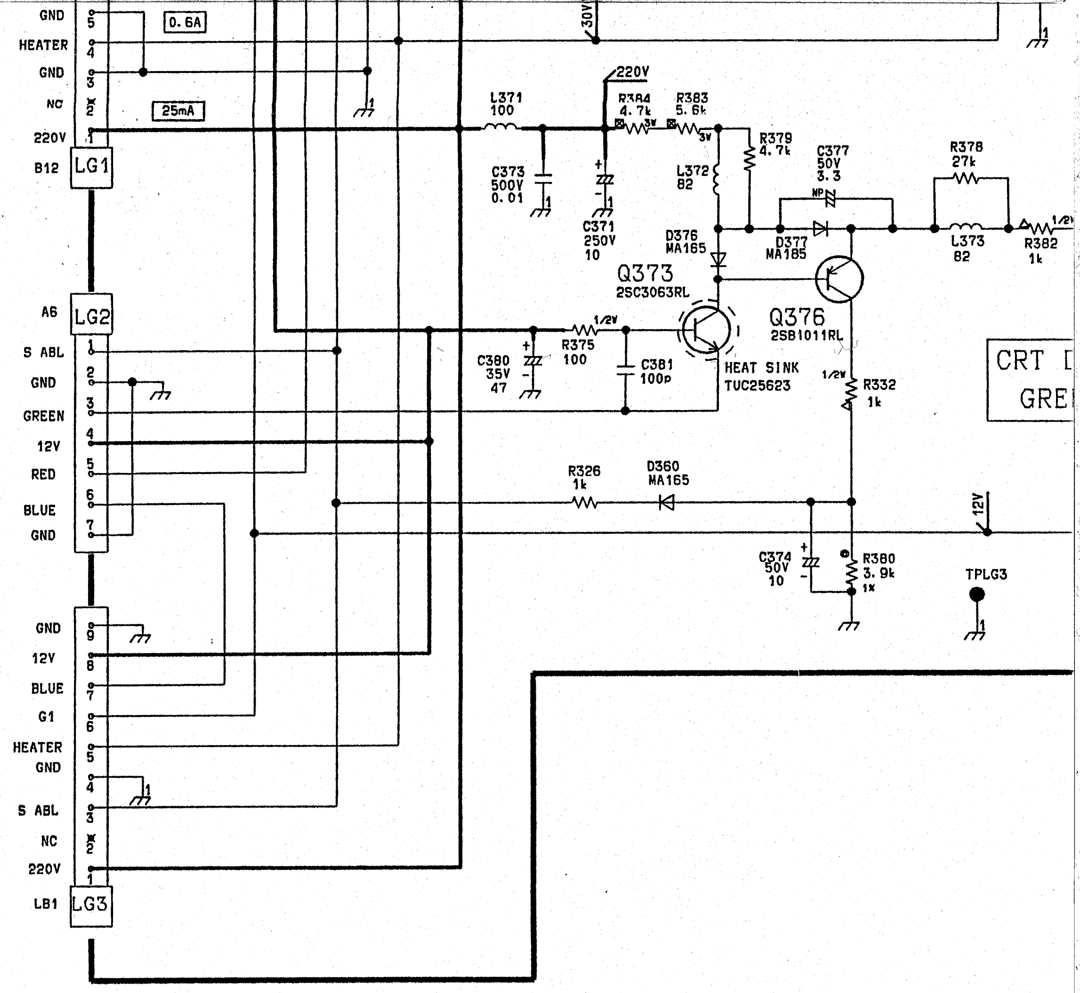
3

LG-Board Schemati


G1
GND
12V
RED
S ABL
GND
HEATER
220V
LR1
LG4
TNPA0611
220V
GND
HEATER
GND
NC
220V
B12
LG1
0.6A
25mA
L371
100
C373
500V
0.01
R384
4.7k
R383
5.6k
R379
4.7k
C377
50V
3.3
R378
27k
L372
82
C371
250V
10
D376
MA165
D377
MA185
L373
82
R382
1k
Q373
2SC3063RL
Q376
2SB1011RL
A6
LG2
S ABL
GND
GREEN
12V
C380
35V
47
R375
100
C381
100p
HEAT SINK
TUC25623
R332
1k
CRT D
GREE

3


220V
R364 4.7k
R363 5.6k
C353 500V 0.01
C351 250V 10
L352 82
R359 4.7k
C357 50V 3.3
D357 MA165
D356 MA165
Q353 2SC3063RL
Q356 2SB1011RL
HEAT SINK TUC25623
L351 100
C360 35V 47
R355 100 1/2W
C361 100p
R358 27k
L353 82
R362 1k
TPLR1
R331 1k
JK351 TJ51A5160
FOCUS
(TO FBT)
EHT EHT (TO FBT)
C356 3300p 2kV
LR6
1kV
R356 120k
C354 50V 10
R360 3.9k
TPLR3
C359 2kV 0.001
J52
LR8
FOCUS PACK G2
D359 MA165
30VOP
R325 1k
LR1
LG4
GND
12V
RED
5 ABL
GND
HEATER
220V


GND
HEATER
GND
NC
220V
B12
LG1
0.6A
25mA
30V
220V
L371 100
R384 4.7k
R383 5.6k
R379 4.7k
C377 50V 3.3
R378 27k
C373 500V 0.01
L372 82
C371 250V 10
D376 MA165
D377 MA165
L373 82
R382 1k
Q373 2SC3063RL
Q376 2SB1011RL
A6
LG2
5 ABL
GND
GREEN
12V
RED
BLUE
GND
C380 35V 47
R375 100
C381 100p
HEAT SINK TUC25623
R332 1k
CRT D
GRE
R326 1k
D360 MA165
12V
C374 50V 10
R380 3.9k
TPLG3
GND
12V
BLUE
G1
HEATER
GND
5 ABL
NC
220V
LB1
LG3

4

LR-Board Voltage Measurements (Transistors)

	Q353	Q356
B	11.70	169.30
C	169.20	1.71
E	11.30	169.80

LG-Board Voltage Measurements

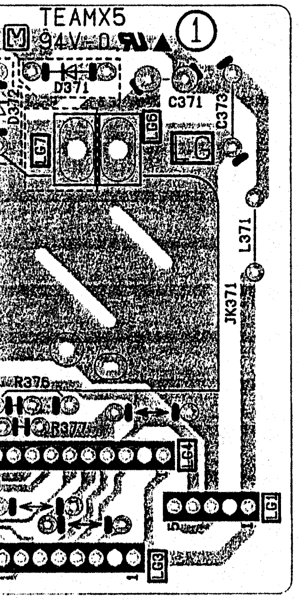
	Q373	Q376
B	165.10	11.70
C	2.33	165.10
E	165.70	11.20

5

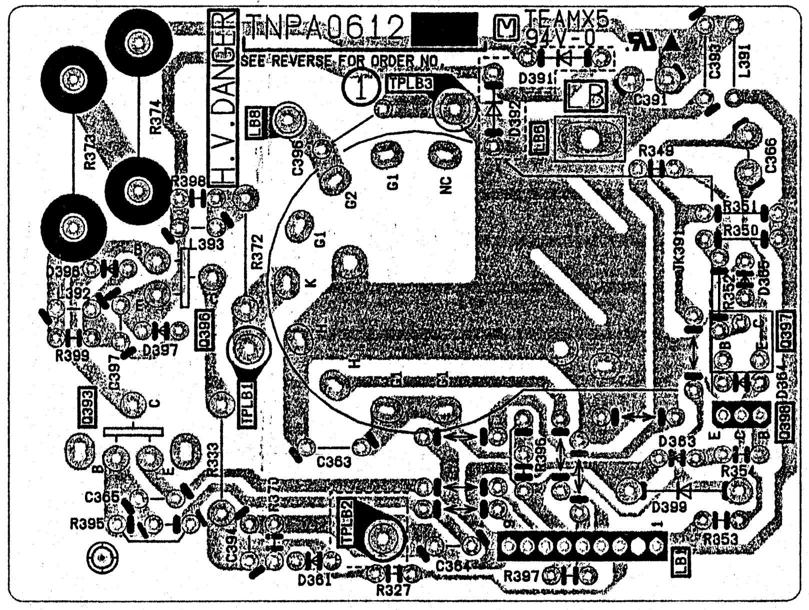
IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL
THAT ARE IMPORTANT FOR PROTECTION FROM X RADI
AND ELECTRICAL SHOCK HAZARDS. WHEN SERVI
ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED
USED FOR THE CRITICAL COMPONENTS DESIGNATED W
THE SCHEMATIC.

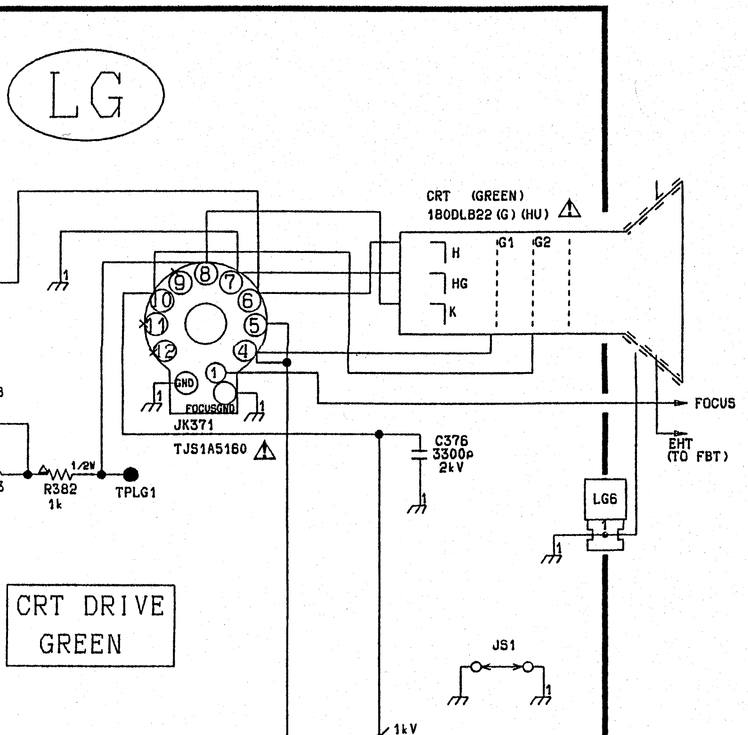
A0611)


TEAMX5
94V-0
①
D371
C371
C373
L371
JK371
R376
LG1
LG5
LG3

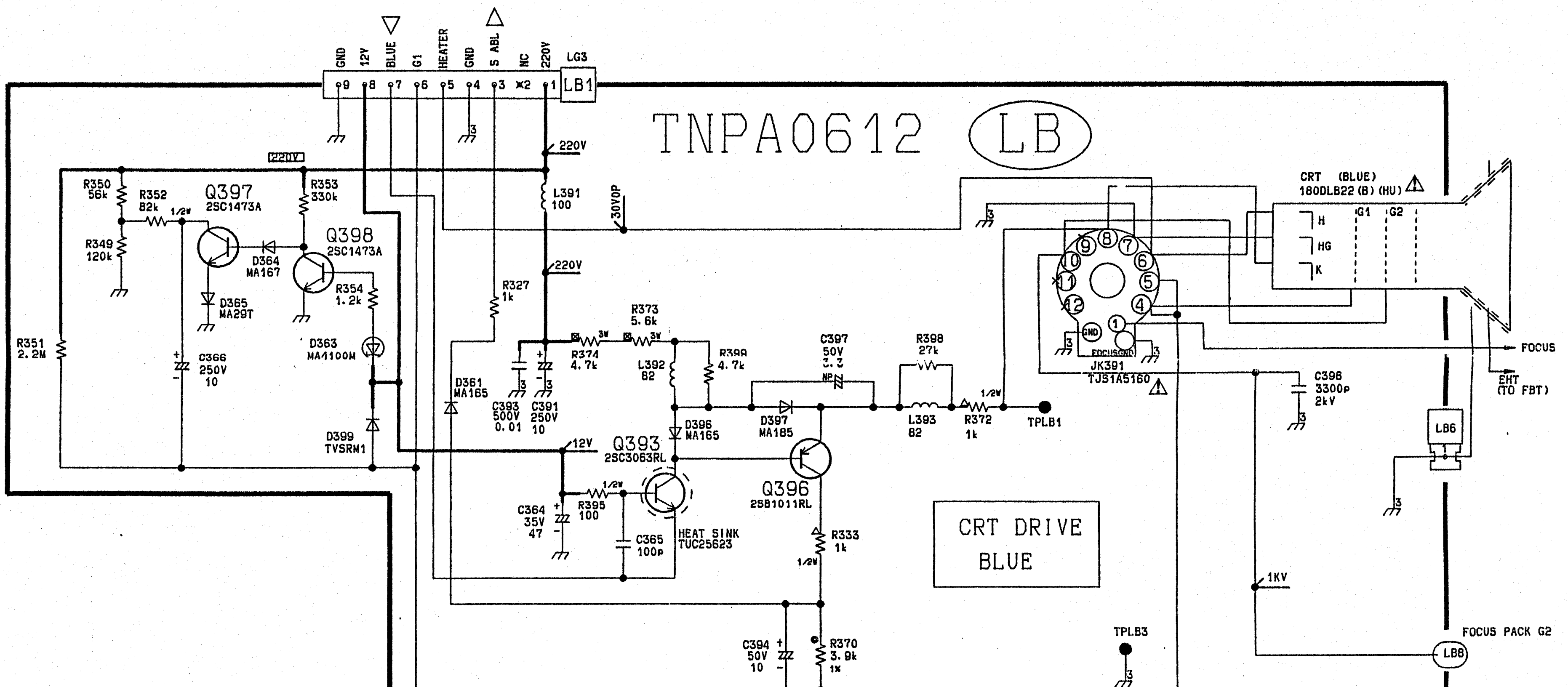
LB-Board (TNPA0612)

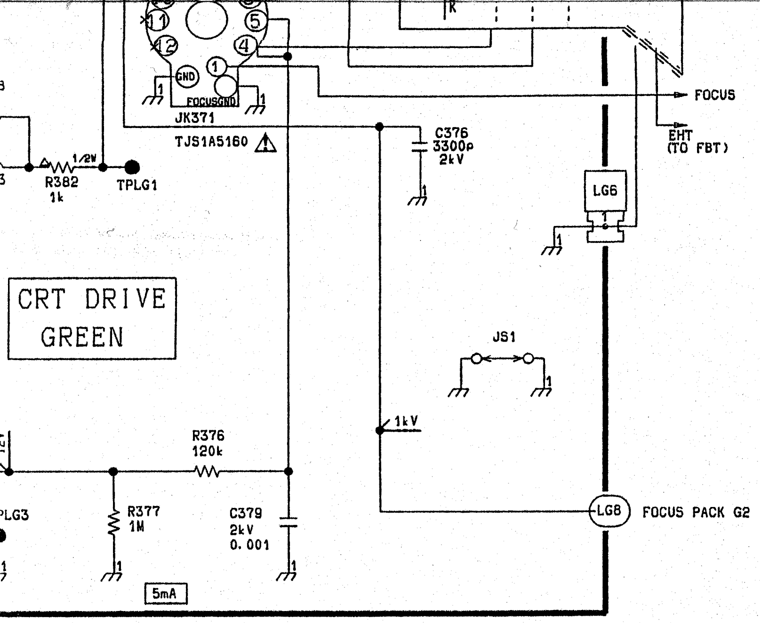

TNPA0612
TEAMX5
94V-0
SEE REVERSE FOR ORDER NO.
H.V. DANGER
①
TPLB3
D391
C391
C392
L391
R373
R374
C396
R398
L393
R372
G2
G1
NC
K
R349
C366
R351
R350
JK391
D365
LB8
LB6
D398
L392
D397
R399
D393
D396
TPLB1
R333
C363
C365
R395
R370
C394
TPLB2
D361
C364
R327
R397
D363
R354
D399
R353
LB1

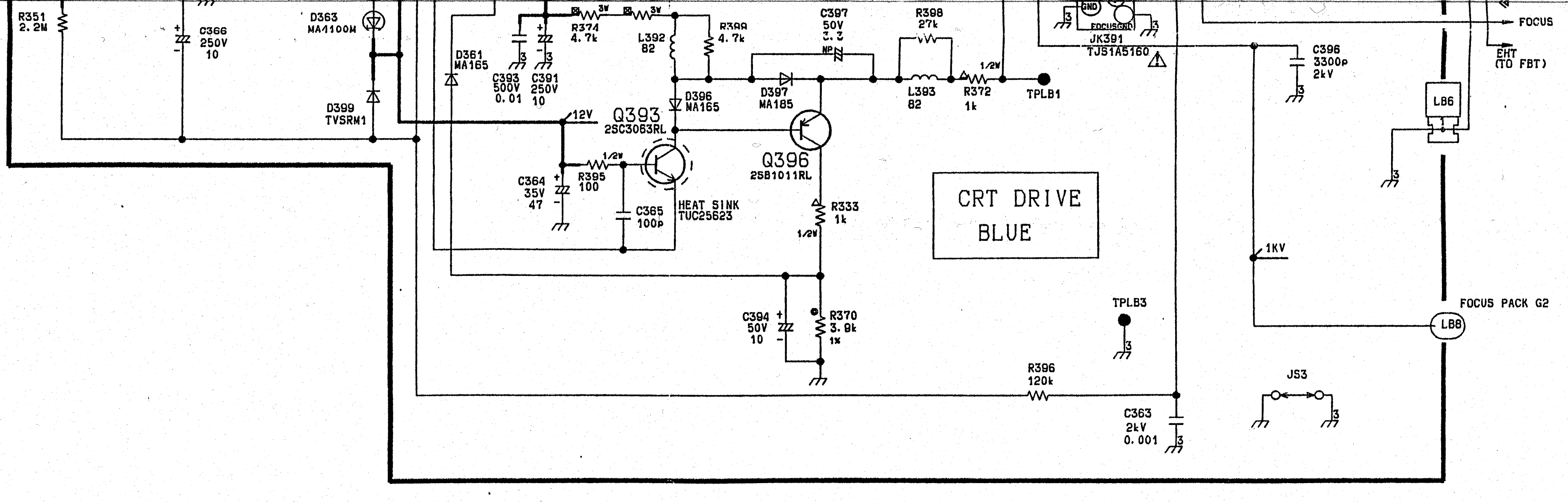
matic


LG
CRT (GREEN)
180DLB22 (G) (HU)
H
HG
K
G1
G2
GND
FOCUS
JK371
TJS1A5160
FOCUS
EHT
(TO FBT)
C376
3300p
2kV
R382
1k
1/2W
TPLG1
LG6
CRT DRIVE
GREEN
JS1
1kV

LB-Board Schematic


GND
12V
BLUE
G1
HEATER
GND
S ABL
NC
220V
LG3
LB1
TNPA0612
LB
220V
R350
56k
R352
82k
1/2W
Q397
2SC1473A
R353
330k
Q398
2SC1473A
R349
120k
D364
MA167
D365
MA29T
R354
1.2k
C366
250V
10
D363
MA4100H
D399
TVSRM1
R351
2.2M
L391
100
220V
300V0P
R327
1k
R373
5.6k
3W
R374
4.7k
L392
82
R399
4.7k
C397
50V
3.3
NP
R398
27k
L393
82
R372
1k
1/2W
TPLB1
D361
MA165
C393
500V
0.01
C391
250V
10
D396
MA165
D397
MA165
12V
Q393
2SC3063RL
Q396
2SB1011RL
C364
35V
47
R395
100
C365
100p
HEAT SINK
TUC25623
R333
1k
1/2W
CRT DRIVE
BLUE
C394
50V
10
R370
3.9k
1W
TPLB3
CRT (BLUE)
180DLB22 (B) (HU)
H
HG
K
G1
G2
GND
FOCUS
JK391
TJS1A5160
FOCUS
EHT
(TO FBT)
C398
3300p
2kV
LB6
1KV
FOCUS PACK G2
LB8


JK371
TJS1A5160
GND
FOCUSGND
C376
3300p
2kV
FOCUS
EHT
(TO FBT)
R382
1k
1/2W
TPLG1
LG6
CRT DRIVE
GREEN
JS1
1kV
R376
120k
R377
1M
C379
2kV
0.001
LG6
FOCUS PACK G2
PLG3
5mA


R351
2.2M
C366
250V
10
D363
MA4100H
D399
TVSRN1
D361
MA165
C393
500V
0.01
C391
250V
10
R374
4.7k
L392
82
R399
4.7k
C397
50V
3.3
R398
27k
12V
Q393
2SC3063RL
D396
MA165
D397
MA165
L393
82
R372
1k
TPLB1
Q396
2SB1011RL
C364
35V
47
R395
100
C365
100p
HEAT SINK
TUC25623
R333
1k
CRT DRIVE
BLUE
C394
50V
10
R370
3.9k
TPLB3
R396
120k
C363
2kV
0.001
JS3
JK391
TJS1A5160
GND
FOCUSGND
C396
3300p
2kV
LB6
1KV
LB6
FOCUS PACK G2
FOCUS
EHT
(TO FBT)

nents (Transistors)

76
70
10
20

LB-Board Voltage Measurements (Transistors)

	Q393	Q396	Q397	Q398
B	11.70	163.80	0.10	0.65
C	162.80	2.99	148.10	0.04
E	11.30	163.40	0.03	GND

OTICE
SPECIAL FEATURES
OM X-RADIATION, FIRE
EN SERVICING. IT IS
SPECIFIED PARTS BE
GNATED WITH A ⚠ IN

MTC990312C1

Sheet 1 of 5
Side B

LB/LG/LR-Boards
Schematics, Voltages & Layouts
PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

A B C D

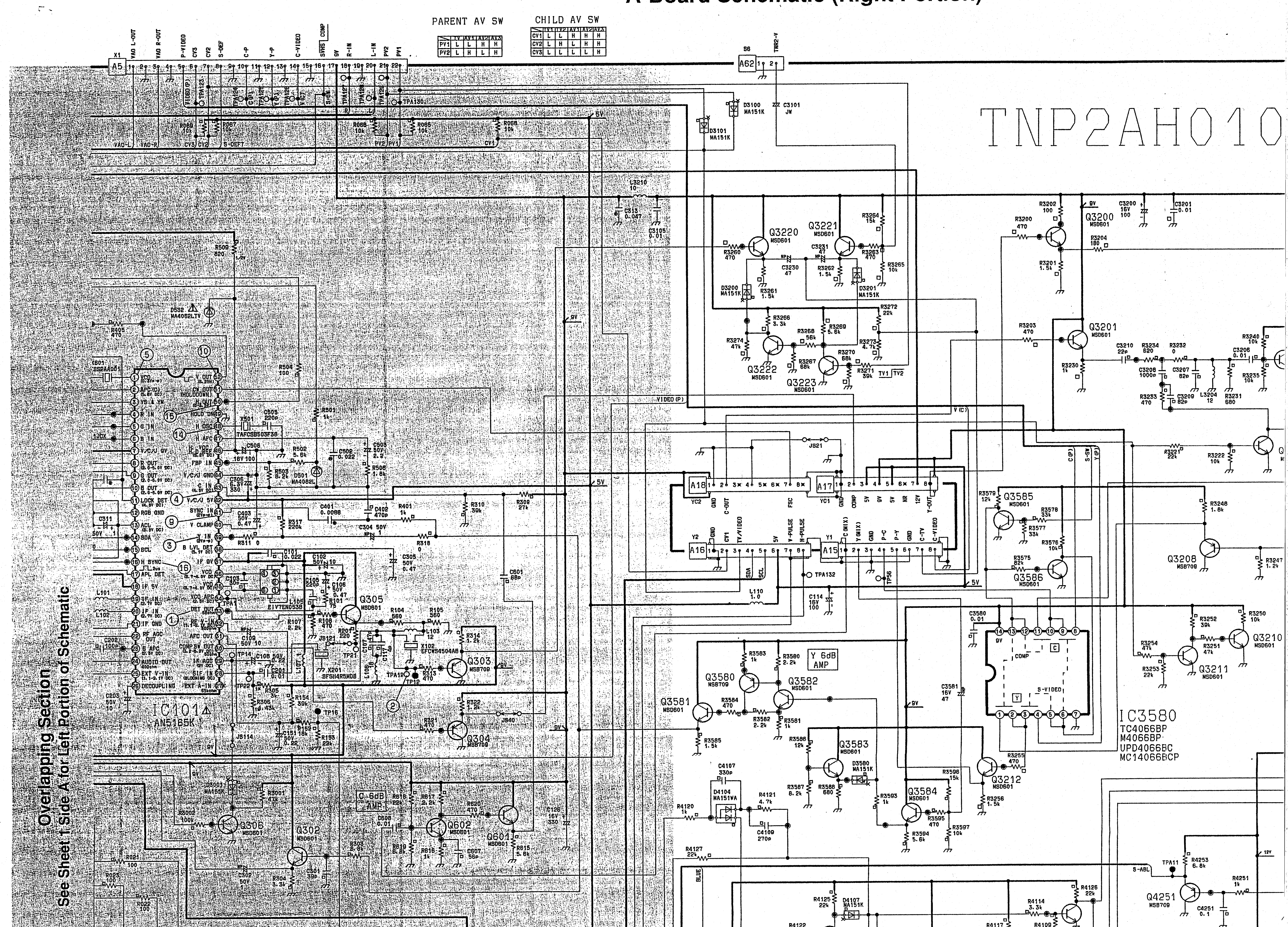
A-Board Schematic (Right Portion)

PARENT AV SW

	TV	AV1	AV2	AV3
PV1	L	L	H	H
PV2	L	H	L	H

CHILD AV SW

	TV1	TV2	AV1	AV2	AV3
CV1	L	L	H	H	H
CV2	L	H	L	H	H
CV3	L	L	L	L	H



1
2
3
TNP2AH010
A5
VAO L-OUT
VAO R-OUT
P-VIDEO
CV3
CV2
S-DEF
C-P
Y-P
C-VIDEO
SVHS COMP
9V
R-IN
L-IN
PV2
PV1
TPA130
A62
S6
TNR2-Y
D3100 MA151K
C3101 JW
D3101 MA151K
5V
L3210
C313 0.047
C3105 0.01
Q3220 MSD601
Q3221 MSD601
Q3222 MSD601
Q3223 MSD601
Q3200 MSD601
Q3201 MSD601
D3200 MA151K
D3201 MA151K
D532 MA4062LTV
R509 820
IC101 AN5165K
X501 TAFCSB503F38
D501 MA4082L
Q305 MSD601
Q303 MSB709
Q304 MSB709
Q306 MSD601
Q302 MSD601
Q602 MSD601
Q601 MSD601
C-6dB AMP
X201 SFSH4R5MDB
X102 EFCM54504A8
E1V7EN0538
D3001 MA155K
JS114
JS121
J840
JS21
VIDEO (P)
V (C)
A18
A17
A16
A15
YC2
YC1
Y2
Y1
TPA132
TP56
L110 1.0
C114 16V 100
Q3585 MSD601
Q3586 MSD601
Q3208 MSB709
Q3210 MSD601
Q3211 MSD601
Q3212 MSD601
Q3580 MSB709
Q3581 MSD601
Q3582 MSD601
Q3583 MSD601
Q3584 MSD601
Y 6dB AMP
D3580 MA151K
D4104 MA151VA
D4107 MA151K
IC3580
TC4066BP
M4066BP
UPD4066BC
MC14066BCP
COMP
S-VIDEO
Q4251 MSB709
TPA11
S-ABL
BLUE
12V

Overlapping Section
See Sheet 1 Side A for Left Portion of Schematic

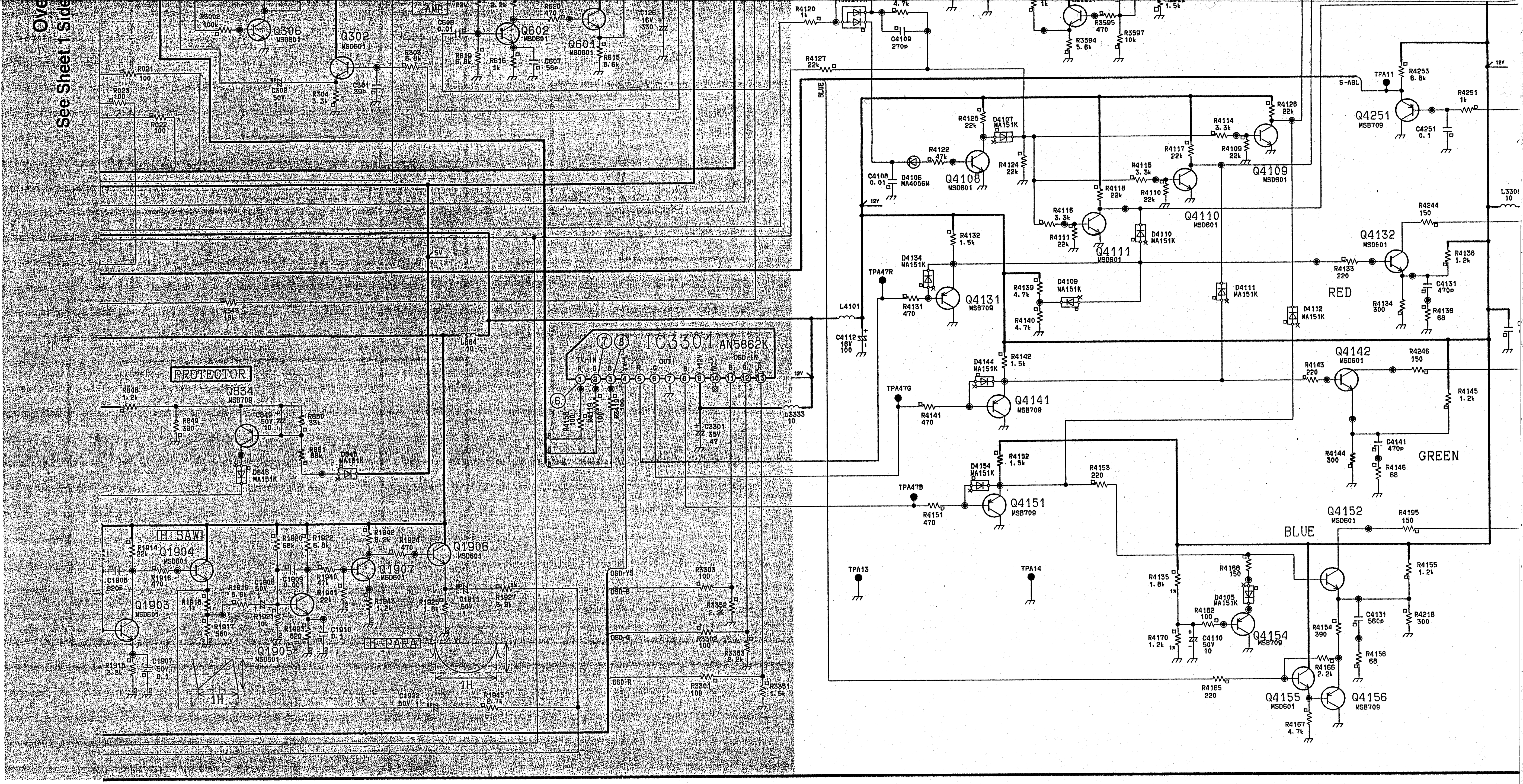
12C1

A-Board Schematic (Cont), Voltages & Waveforms

PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

Sheet 2 of 5
Side A

MTC9903012C1


3
4
5
See Sheet 1 Side
Q306
Q302
Q602
Q601
AMP
PROTECTOR
Q834
H-SAW
Q1904
Q1903
Q1905
Q1906
Q1907
H-PARA
1H
IC3301 AN5862K
TV-IN
OUT
OSD-IN
OSD-YS
OSD-B
OSD-G
OSD-R
L3333
L4101
TPA47R
TPA47G
TPA47B
TPA13
TPA14
TPA11
Q4108
Q4109
Q4110
Q4111
Q4131
Q4132
Q4141
Q4142
Q4151
Q4152
Q4154
Q4155
Q4156
Q4251
S-ABL
RED
GREEN
BLUE
12V
5V

Voltage Measurements

1. Voltage measurement:
   AC input to the Receiver is 120V.
   NTSC (HD: 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern or 100 IRE white and 7.5 IRE black.)
   All Picture and Audio adjustments are set to Normalize.
   TV ANT/CABLE – (Set-Up Menu) In TV ANT Mode.
   Volume – Min.
   TV Video SW – TV position.
   Audio Mode – Stereo.
   Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content. Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

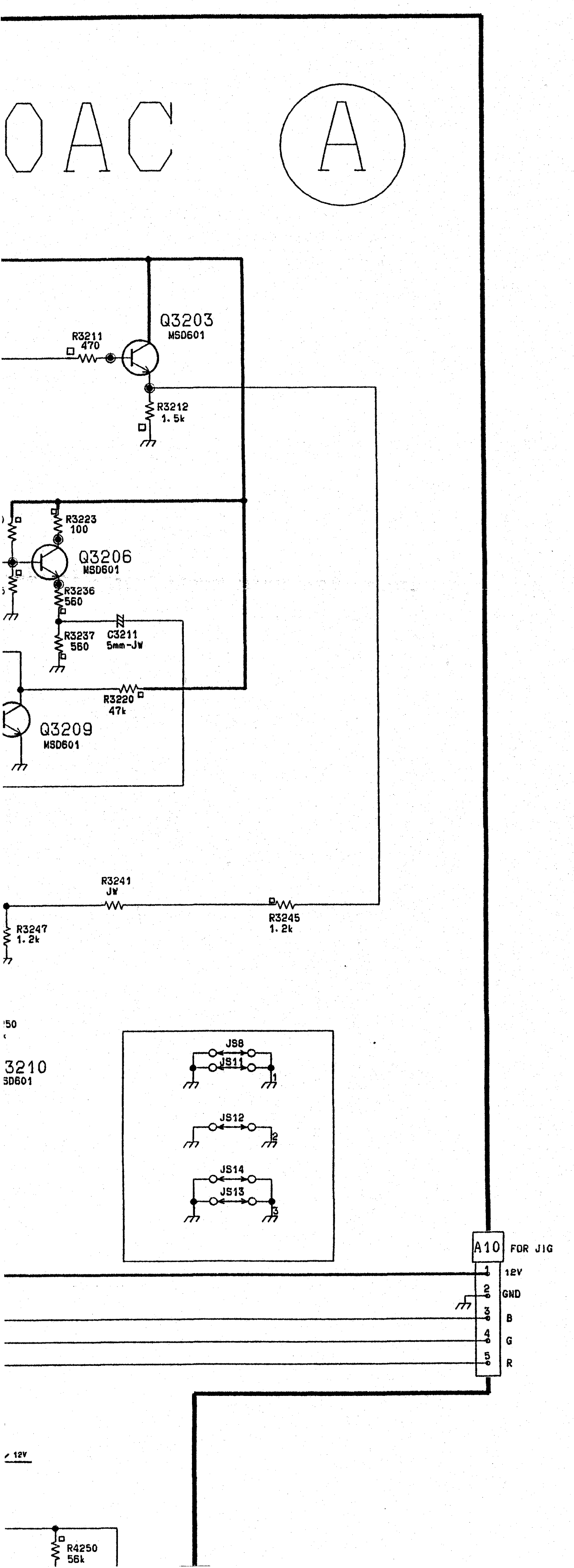
CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in μH.
4. Test point indicated by ●. Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**. ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

E	F	G	H



A-Board Voltage Measurements (ICs and Transistors)

IC001			
1	4.87	33	4.96
2	2.42	34	4.97
3	2.57	35	5.00
4	3.42	36	0.00
5	4.99	37	n.c
6	0.99	38	GND
7	2.54	39	0.15
8	0.00	40	4.96
9	n.c	41	0.00
10	4.98	42	0.00
11	4.30	43	0.00
12	GND	44	0.00
13	2.50	45	n.c
14	n.c	46	-0.17
15	n.c	47	4.72
16	n.c	48	0.07
17	4.44	49	0.07
18	3.54	50	0.30
19	3.43	51	0.08
20	3.31	52	0.07
21	n.c	53	0.07
22	4.99	54	5.12
23	0.00	55	4.06
24	n.c	56	n.c
25	1.27	57	5.01
26	2.14	58	n.c
27	GND	59	3.17
28	n.c	60	3.18
29	n.c	61	5.02
30	n.c	62	2.25
31	4.91	63	2.13
32	0.00	64	GND

IC002	
1	GND
2	GND
3	GND
4	GND
5	3.17
6	3.21
7	GND
8	4.99

IC832	
1	11.61
2	GND
3	8.86

IC833	
1	7.06
2	GND
3	4.97

IC834	
1	GND
2	-23.57
3	-12.14

IC101			
1	2.57	27	n.c
2	5.67	28	2.86
3	0.00	29	2.67
4	0.00	30	3.06
5	0.00	31	4.77
6	0.00	32	2.12
7	8.83	33	2.97
8	2.55	34	2.60
9	3.86	35	3.46
10	3.17	36	3.46
11	4.24	37	8.83
12	GND	38	3.96
13	3.48	39	4.33
14	3.16	40	2.83
15	3.20	41	4.31
16	0.28	42	4.96
17	3.28	43	5.17
18	4.96	44	0.00
19	2.74	45	0.49
20	2.74	46	6.07
21	GND	47	4.12
22	4.25	48	2.08
23	5.33	49	GND
24	4.07	50	1.13
25	1.75	51	6.38
26	5.98	52	4.14

	Q001	Q002	Q004	Q005	Q302	Q303
B	4.98	5.66	4.85	5.66	4.42	1.12
C	GND	10.22	5.64	4.99	8.83	GND
E	4.97	5.01	5.66	GND	3.81	1.80

	Q304	Q305	Q306	Q834	Q401	Q402
B	2.92	2.83	0.00	5.47	4.71	4.14
C	GND	8.83	8.79	0.10	4.96	GND
E	3.58	2.20	GND	5.58	4.06	4.72

	Q601	Q602
B	5.80	2.00
C	8.83	5.80
E	5.19	1.36

	Q410	Q411	Q1110	Q1582	Q1903	Q1904
B	0.62	0.04	0.03	0.00	1.26	6.82
C	0.06	4.66	0.81	4.99	6.85	11.73
E	GND	GND	GND	GND	0.70	6.21

	Q1905	Q1906	Q1907	Q1908	Q1909	Q2201
B	1.46	6.36	1.36	-0.19	0.59	0.00
C	4.34	11.74	6.38	0.59	2.23	7.76
E	0.86	5.73	0.77	GND	GND	GND

	Q2202	Q2203	Q2204	Q3200	Q3201	Q3205
B	0.61	4.30	4.30	5.22	6.44	4.57
C	0.00	8.70	8.70	8.38	8.70	8.70
E	GND	3.67	3.67	4.57	5.78	3.92

	Q3206	Q3208	Q3209	Q3210	Q3211	Q3212
B	4.32	1.96	0.00	0.63	0.00	2.62
C	8.36	GND	8.66	0.02	5.06	8.70
E	3.67	2.63	GND	GND	GND	2.00

	Q3220	Q3221	Q3222	Q3223	Q3580	Q3581
B	1.80	3.38	0.64	0.08	6.73	5.10
C	8.70	8.70	0.08	3.55	5.10	8.70
E	1.38	2.97	GND	GND	7.36	4.46

	Q3582	Q3583	Q3584	Q3585	Q3586	Q4108
B	2.84	3.48	3.43	0.00	0.63	0.62
C	6.73	8.70	8.70	7.68	0.00	0.02
E	2.23	2.85	2.84	GND	GND	GND

	Q4109	Q4110	Q4111	Q4131	Q4132	Q4141
B	0.22	0.22	0.22	3.28	3.71	3.34
C	9.31	9.34	9.32	GND	10.46	GND
E	GND	GND	GND	3.72	3.57	3.79

	Q4142	Q4151	Q4152	Q4154	Q4155	Q4156
B	3.79	3.15	3.58	4.66	3.45	2.87
C	10.39	GND	10.38	GND	11.70	GND
E	3.62	3.59	3.45	4.84	2.87	3.15

	Q4251	Q7006	Q7007	Q7031
B	1.67	-23.60	-23.60	3.87
C	GND	-22.40	-22.40	GND
E	2.29	-23.60	-23.60	4.93

IC2201	
1	GND
2	3.16
3	3.18
4	2.14
5	7.64
6	4.36
7	2.70
8	8.71
9	4.25
10	4.38
11	4.35
12	4.26
13	3.05
14	4.38
15	3.70
16	4.36
17	4.32
18	4.38
19	0.46
20	4.41
21	GND
22	4.29
23	0.46
24	4.18
25	4.38
26	4.38
27	4.36
28	4.53

IC2202	
1	3.02
2	4.38
3	4.38
4	4.38
5	7.76
6	7.76
7	GND
8	4.38
9	4.48
10	4.37
11	3.01
12	0.00
13	0.00
14	8.83

IC2301	
1	1.12
2	0.00
3	32.70
4	GND
5	0.00
6	1.12
7	15.90
8	4.72
9	GND
10	33.30
11	n.c
12	16.03

IC2401	
1	4.29
2	GND
3	4.33
4	4.32
5	4.34
6	4.32
7	4.30
8	3.26
9	4.31
10	1.69
11	3.22
12	3.15
13	1.62
14	4.30
15	4.29
16	4.28
17	4.31
18	4.30
19	4.33
20	4.34
21	8.71
22	4.29

IC3301	
1	3.24
2	3.30
3	3.10
4	0.04
5	3.29
6	3.35
7	GND
8	3.16
9	11.60
10	n.c
11	0.61
12	0.60
13	0.57

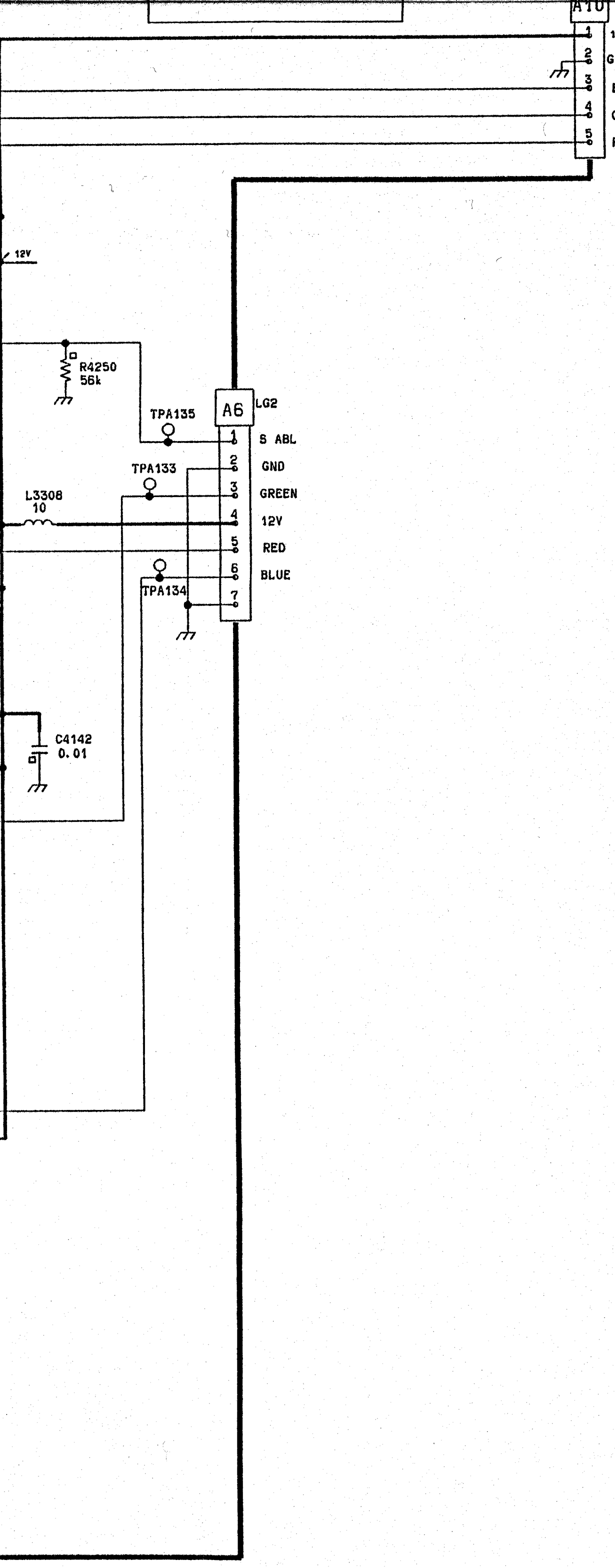
IC3580	
1	2.62
2	2.62
3	2.62
4	3.51
5	0.00
6	0.00
7	GND
8	0.00
9	1.84
10	1.84
11	1.84
12	7.68
13	7.68
14	8.69

IC7001	
1	GND
2	GND
3	-22.40
4	-23.60
5	22.90

IC7002	
1	GND
2	GND
3	-22.40
4	-23.60

Note:

Voltages were obtained using a digital multimeter.



21	GND
22	4.29
23	0.46
24	4.18
25	4.38
26	4.38
27	4.36
28	4.53

5	0.00
6	1.12
7	15.90
8	4.72
9	GND
10	33.30
11	n.c
12	16.03

21	[illegible]
22	4.29

IC7001	
1	GND
2	GND
3	-22.40
4	-23.60
5	22.90
6	-0.24
7	-0.24
8	-23.60
9	-0.26
10	22.90
11	-0.09
12	-23.60
13	-0.08
14	-0.08
15	-0.22
16	-0.22
17	-23.60
18	-0.24

IC7002	
1	GND
2	GND
3	-22.40
4	-23.60
5	22.90
6	-0.07
7	-0.07
8	-23.60
9	-0.08
10	22.90
11	-0.17
12	-23.60
13	-0.16
14	-0.16
15	0.00
16	0.00
17	-23.60
18	0.00

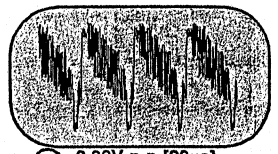
Note:

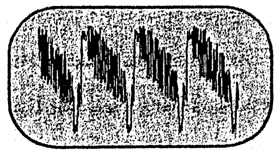
Voltages were obtained using a digital multimeter.

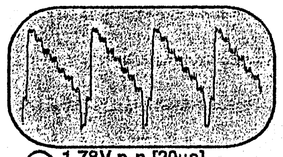
B	3.79	3.15	3.58	4.66	3.45	2.87
C	10.39	GND	10.38	GND	11.70	GND
E	3.62	3.59	3.45	4.84	2.87	3.15

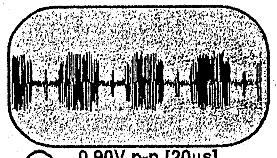
	Q4251	Q7006	Q7007	Q7031
B	1.67	-23.60	-23.60	3.87
C	GND	-22.40	-22.40	GND
E	2.29	-23.60	-23.60	4.93

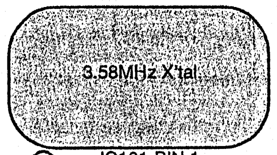
Waveforms - A-Board


① 2.08V p-p [20µs]
IC101 PIN 33 (DET OUT)

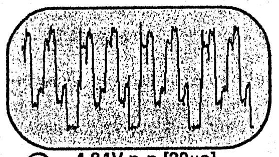

② 1.09V p-p [20µs]
TP12

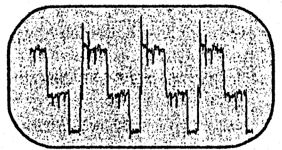

③ 1.78V p-p [20µs]
IC101 PIN 39 (Y IN)

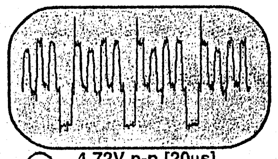

④ 0.90V p-p [20µs]
IC101 PIN 43 (C IN)

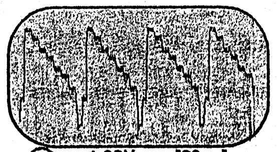


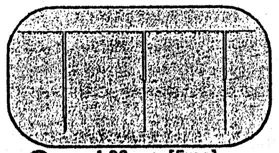
⑤ IC101 PIN 1
3.58VCO
OSC

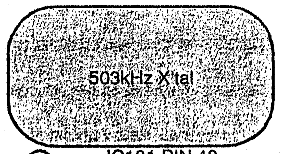

⑥ 4.84V p-p [20µs]
IC3301 PIN 1 (R)


⑦ 5.40V p-p [20µs]
IC3301 PIN 2 (G)

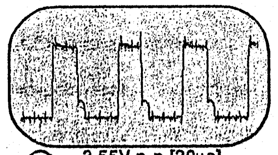

⑧ 4.72V p-p [20µs]
IC3301 PIN 3 (B)

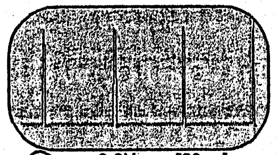

⑨ 1.88V p-p [20µs]
IC101 PIN 41 (SYNC)


⑩ 4.00 p-p [5ms]
IC101 PIN 52
(VERT OUT)



⑭ IC101 PIN 48
H OSC


⑮ 3.55V p-p [20µs]
IC101 PIN 50 (H OUT)


⑯ 8.0V p-p [20µs]
IC101 PIN 16 (H SYNC)

Boards Designation

- A-Board - Main Chassis
- B-Board - Power Supply
- C-Board - Convergence
- D-Board - Protection Circuit
- K-Board - Customer Controls
- LB/LG/LR-Board - Blue, Green & Red CRT Boards
- R-Board - Remote Sensor
- S-Board - 2nd Tuner
- T-Board - Line Filter
- X-Board - AV Inputs
- Y-Board - PIP Processing
- YC-Board - Digital 3-line Comb Filter

Waveform Measurements

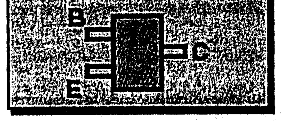
1. ③ Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to MIN.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10:1). Shape and peak altitudes may vary depending on the type of oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

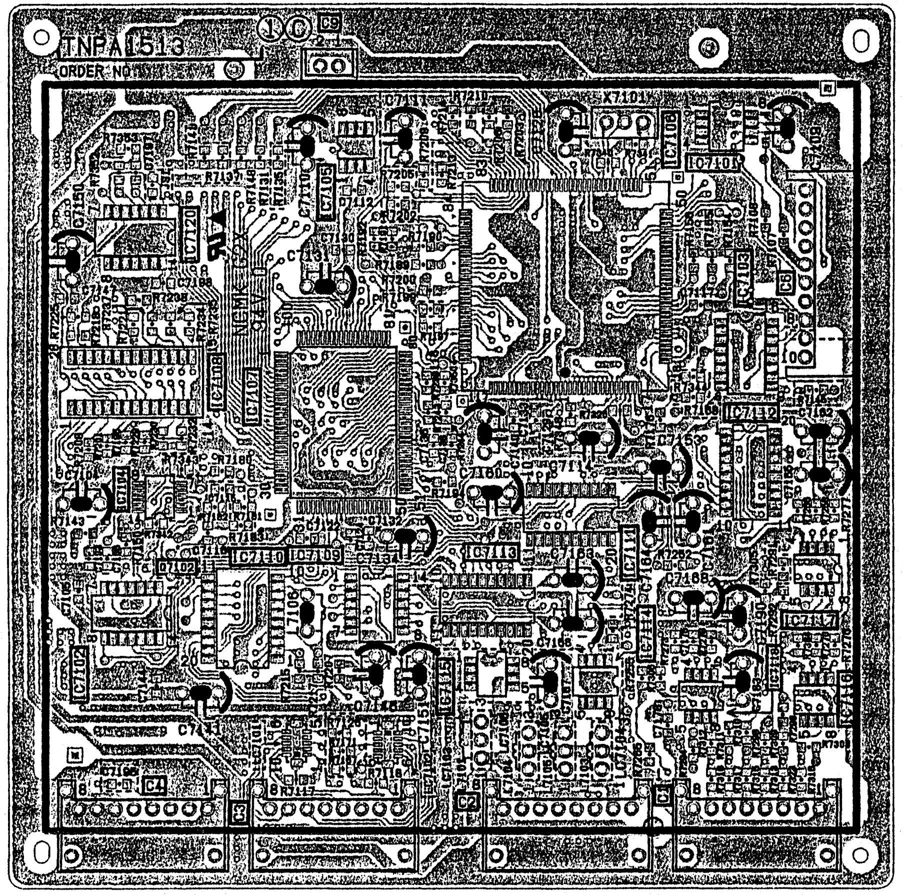
IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

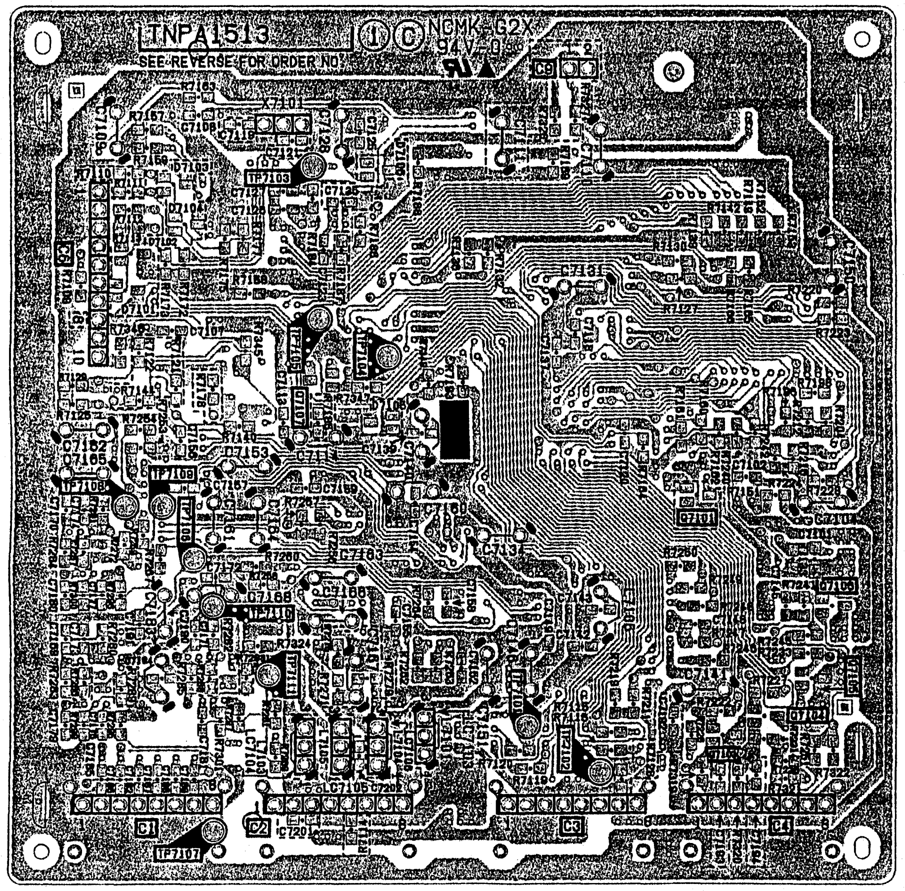
CHIP TRANSISTOR LEAD DESIGNATION

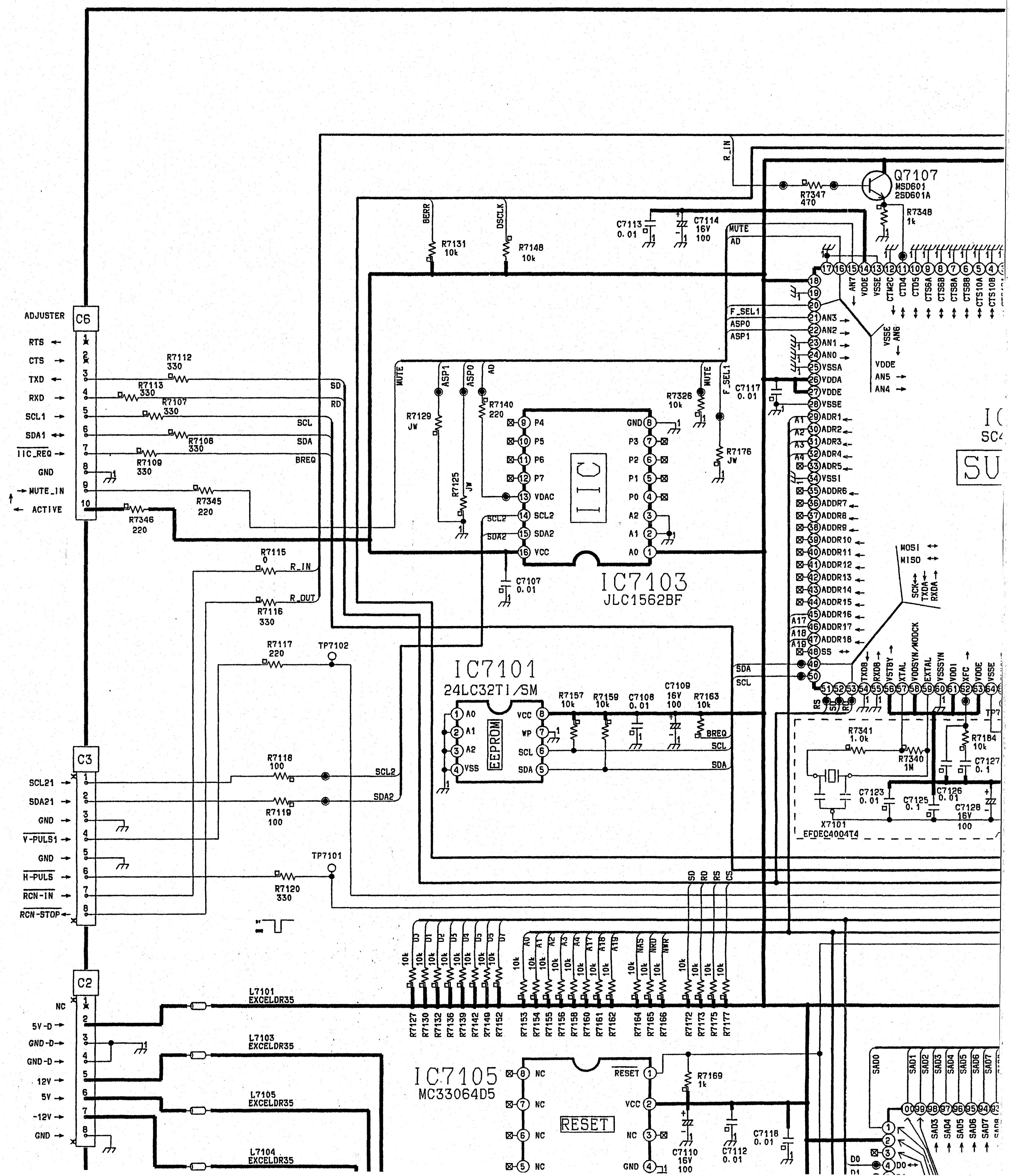


C-Board - Top (TNPA1513)

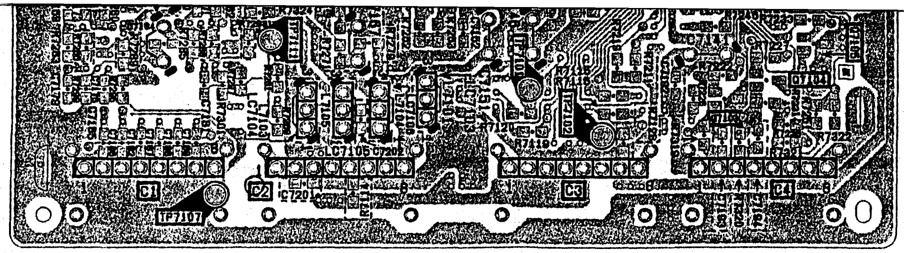

TNPA1513
ORDER NO.
X7101
IC7101
IC7102
IC7103
IC7105
IC7108
IC7109
IC7110
IC7112

C-Board - Bottom (TNPA1513)


TNPA1513
SEE REVERSE FOR ORDER NO.
NCMK-G2X
94V-0
TP7103
TP7102
TP7101
C7131


ADJUSTER
C6
RTS
CTS
TXD
RXD
SCL1
SDA1
IIC_REQ
GND
MUTE_IN
ACTIVE
R7112 330
R7113 330
R7107 330
R7108 330
R7109 330
R7345 220
R7346 220
SD
RD
SCL
SDA
BREQ
R7115 0
R_IN
R_OUT
R7116 330
R7117 220
TP7102
C3
SCL21
SDA21
GND
V-PULS1
H-PULS
RCN-IN
RCN-STOP
R7118 100
R7119 100
SCL2
SDA2
R7120 330
TP7101
C2
NC
5V-D
GND-D
12V
5V
-12V
L7101 EXCELDR35
L7103 EXCELDR35
L7105 EXCELDR35
L7104 EXCELDR35
BERR
DSCLK
R7131 10k
R7148 10k
C7113 0.01
C7114 16V 100
MUTE
AD
R_IN
R7347 470
Q7107
MSD601
2SD601A
R7348 1k
F_SEL1
ASP0
ASP1
MUTE
R7129 JW
R7140 220
R7125 JW
R7326 10k
R7176 JW
C7117 0.01
P4
P5
P6
P7
VDAC
SCL2
SDA2
VCC
GND
P3
P2
P1
P0
A2
A1
A0
IIC
IC7103
JLC1562BF
C7107 0.01
IC7101
24LC32TI/SM
EEPROM
A0
A1
A2
VSS
VCC
WP
SCL
SDA
R7157 10k
R7159 10k
C7108 0.01
C7109 16V 100
R7163 10k
BREQ
SDA
SCL
ANT
TXD0
VDDE
VSSE
CTM2C
CTD4
CTS6A
CTS6B
CTS8A
CTS8B
CTS10A
CTS10B
AN3
AN2
AN1
AN0
VSSA
VDDA
VDDE
VSSE
AN6
AN5
AN4
ADR1
ADR2
ADR3
ADR4
ADR5
VSS1
ADDR6
ADDR7
ADDR8
ADDR9
ADDR10
ADDR11
ADDR12
ADDR13
ADDR14
ADDR15
ADDR16
ADDR17
ADDR18
SS
MOSI
MISO
SCK
TXDA
RXDA
RXD8
TXD8
VSTBY
MODSYN/MODCK
XTAL
EXTAL
VDDSYN
VDDI
XFC
VDDE
VSSE
A1
A2
A3
A17
A18
A19
R7341 1.0k
R7340 1M
R7184 10k
C7127 0.1
C7123 0.01
C7125 0.1
C7126 0.01
C7128 16V 100
X7101
EFOEC4004T4
SC4
SU
SD
RD
RS
CS
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
A3
A4
A17
A18
A19
NAS
NRD
NWR
10k
R7127
R7130
R7132
R7136
R7139
R7142
R7149
R7152
R7153
R7154
R7155
R7156
R7158
R7160
R7161
R7162
R7164
R7165
R7166
R7172
R7173
R7175
R7177
IC7105
MC33064D5
NC
RESET
VCC
GND
R7169 1k
C7110 16V 100
C7112 0.01
C7118 0.01
SAD0
SAD1
SAD2
SAD3
SAD4
SAD5
SAD6
SAD7
D0

3


IP7101
C1
C2
C3
C4
C7101
IC7105
R7186

C-Board Voltage Measurements (Connectors)

Connector C1	Connector C2	Connector C3	Connector C4
1 ..... GND	1 ..... 0.00	1 ..... 3.20	1 ..... GND
2 ..... 0.00	2 ..... 4.96	2 ..... 3.19	2 ..... 0.62
3 ..... -0.24	3 ..... GND	3 ..... GND	3 ..... 0.64
4 ..... -0.07	4 ..... GND	4 ..... 4.66	4 ..... 0.64
5 ..... -0.22	5 ..... 11.60	5 ..... GND	5 ..... 0.04
6 ..... -0.02	6 ..... 4.96	6 ..... 3.85	6 ..... GND
7 ..... -0.16	7 ..... -12.10	7 ..... 4.94	7 ..... GND
8 ..... GND	8 ..... GND	8 ..... 4.96	8 ..... GND

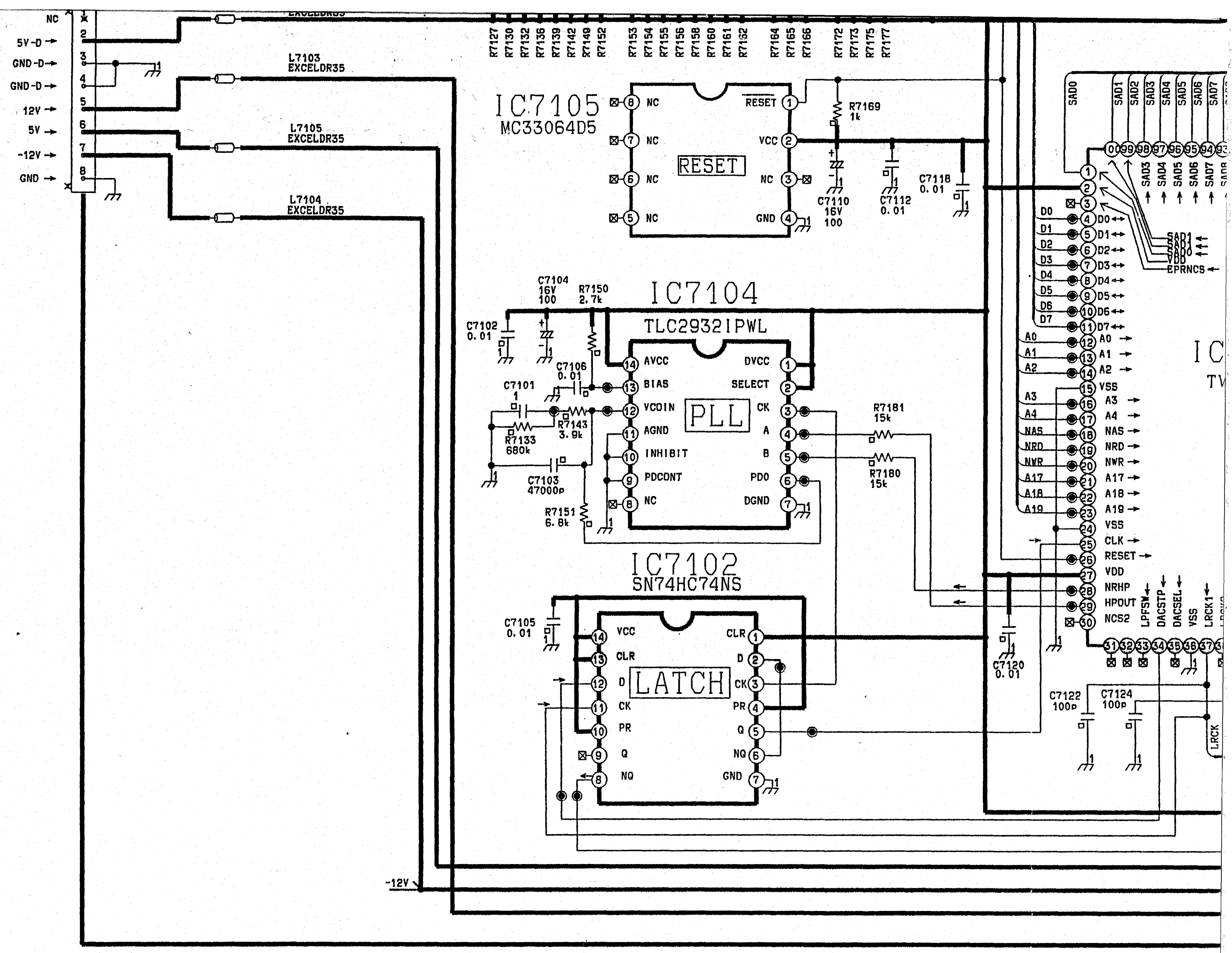
4

Note

This board is non-serviceable. The schematic and board layouts are for reference only.

If the board is defective, replace the board with a new one and return the defective board to the Service Center.

5


NC
5V-D
GND-D
GND-D
12V
5V
-12V
GND
L7103
EXCELDR35
L7105
EXCELDR35
L7104
EXCELDR35
-12V
IC7105
MC33064D5
RESET
NC
RESET
VCC
GND
R7169
1k
C7110
16V
100
C7112
0.01
C7118
0.01
IC7104
TLC2932IPWL
PLL
AVCC
BIAS
VCOIN
AGND
INHIBIT
PDCONT
NC
DVCC
SELECT
CK
A
B
PDO
DGND
C7104
16V
100
R7150
2.7k
C7102
0.01
C7106
0.01
C7101
1
R7143
3.9k
R7133
680k
C7103
47000p
R7151
6.8k
R7181
15k
R7180
15k
IC7102
SN74HC74NS
LATCH
VCC
CLR
D
CK
PR
Q
NQ
GND
C7105
0.01
C7120
0.01
C7122
100p
C7124
100p
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
VSS
A3
A4
NAS
NRD
NWR
A17
A18
A19
VSS
CLK
RESET
VDD
NRHP
HPOUT
NCS2
LPFSW
DACSTP
DACSEL
VSS
LRCK1
LRCK
SAD0
SAD1
SAD2
SAD3
SAD4
SAD5
SAD6
SAD7
VDD
EPRNCS
R7127
R7130
R7132
R7136
R7139
R7142
R7149
R7152
R7153
R7154
R7155
R7156
R7158
R7160
R7161
R7132
R7164
R7165
R7166
R7172
R7173
R7175
R7177
IC
TV

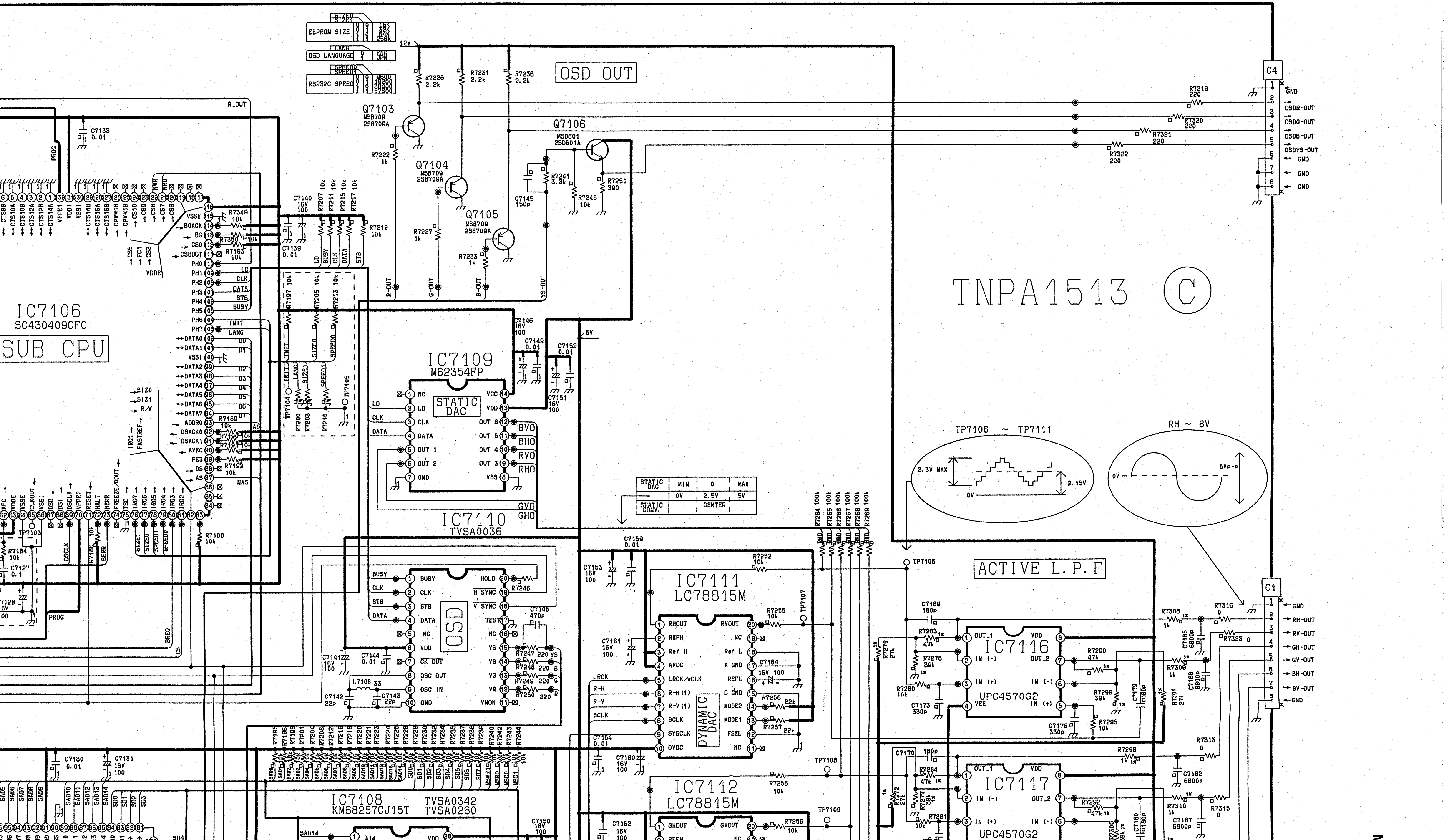
Voltage Measurements

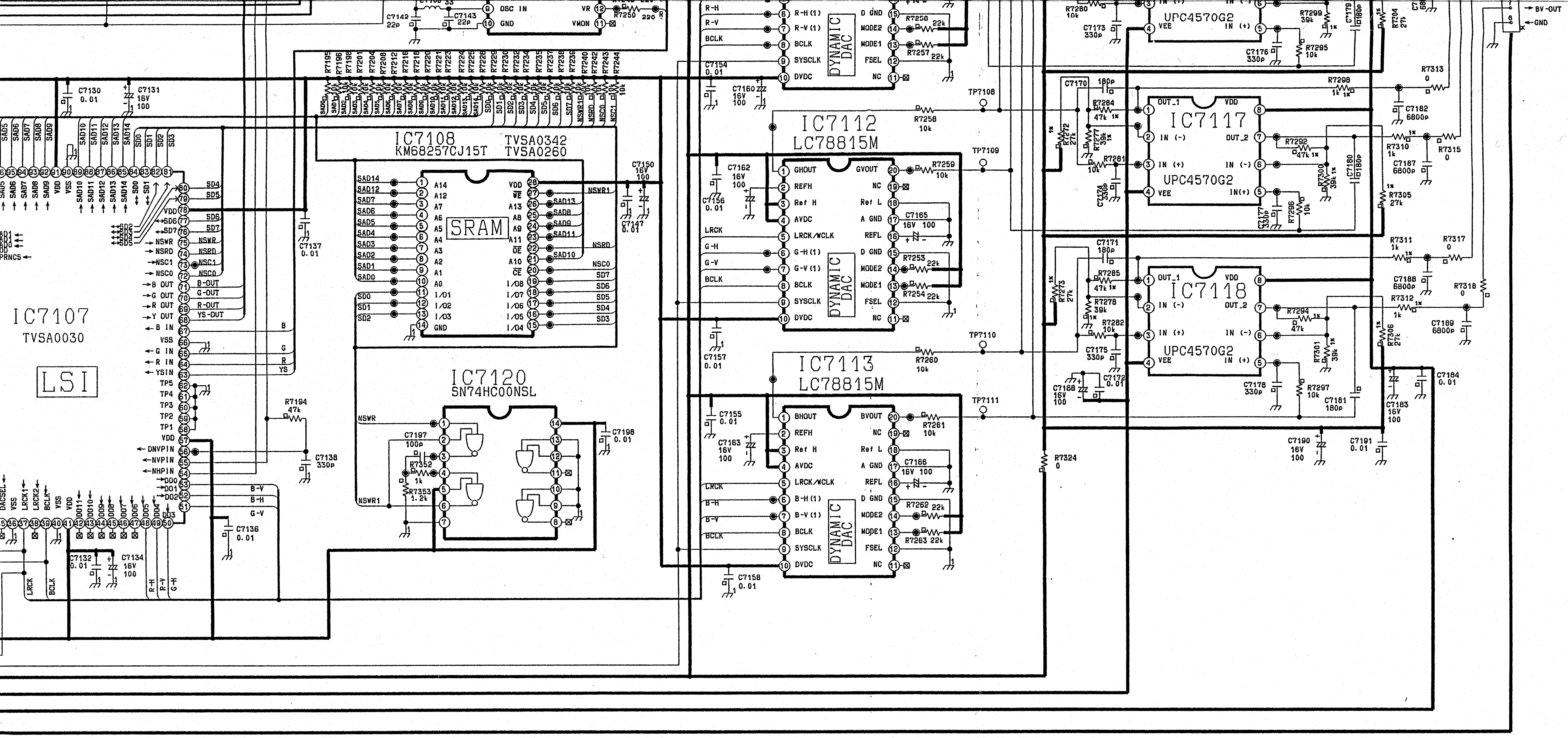
1. Voltage measurement
   - AC input to the Receiver is 120V. NTSC (HD: 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
   - TV ANT/CABLE - (Set-Up Menu) In TV/ANT Mode
   - Volume - Min.
   - TV/Video SW - TV position
   - Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

1. Resistors are ca
   noted otherwise
2. Capacitors are c
   noted otherwise
3. Coil value notes i
4. Test point indicat
   but no pin
5. Components indi
   critical parts and
   be made with ma
   replacement parts

C-Board Schematic


EEPROM SIZE
OSD LANGUAGE
RS232C SPEED
OSD OUT
TNPA1513 Ⓒ
IC7106
SC430409CFC
SUB CPU
IC7109
M62354FP
STATIC DAC
IC7110
TVSA0036
OSD
IC7108
KM68257CJ15T
TVSA0342
TVSA0260
IC7111
LC78815M
DYNAMIC DAC
IC7112
LC78815M
IC7116
UPC4570G2
IC7117
UPC4570G2
ACTIVE L.P.F
Q7103 MSB709 2SB709A
Q7104 MSB709 2SB709A
Q7105 MSB709 2SB709A
Q7106 MSD601 2SD601A
C4
C1
GND
OSDR-OUT
OSDG-OUT
OSDB-OUT
OSDYS-OUT
RH-OUT
RV-OUT
GH-OUT
GV-OUT
BH-OUT
BV-OUT
TP7106 ~ TP7111
3.3V MAX
0V
2.15V
RH ~ BV
5Vp-p
STATIC DAC / STATIC CONV.
MIN 0V · 0 2.5V CENTER · MAX 5V
12V
5V
R-OUT
G-OUT
B-OUT
YS-OUT
BVO
BHO
RVO
RHO
GVO
GHO
TP7105
TP7107
TP7108
TP7109


IC7107
TVSA0030
LSI
IC7108
KM68257CJ15T
TVSA0342
TVSA0260
SRAM
IC7120
SN74HC00NSL
IC7112
LC78815M
IC7113
LC78815M
DYNAMIC DAC
IC7117
IC7118
UPC4570G2
TP7108
TP7109
TP7110
TP7111
BV-OUT
GND

Schematic Notes

are carbon 1/4W unless
rwise.
are ceramic 50V unless
rwise.
notes is inductance in µH.
ndicated by Test point
ts indicated with ⚠ are
s and replacement should
with manufacture specified
nt parts only.

6 ▬ (**BOLD LINE**) indicates the route of B+ supply.

7 The schematic diagrams are current at the time of printing and are subject to change without notice.

8 Ground symbol ⏚ indicates **HOT GROUND CONNECTION** ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

Waveform Measurements

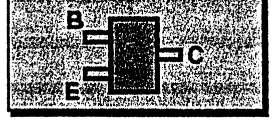
1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location In common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

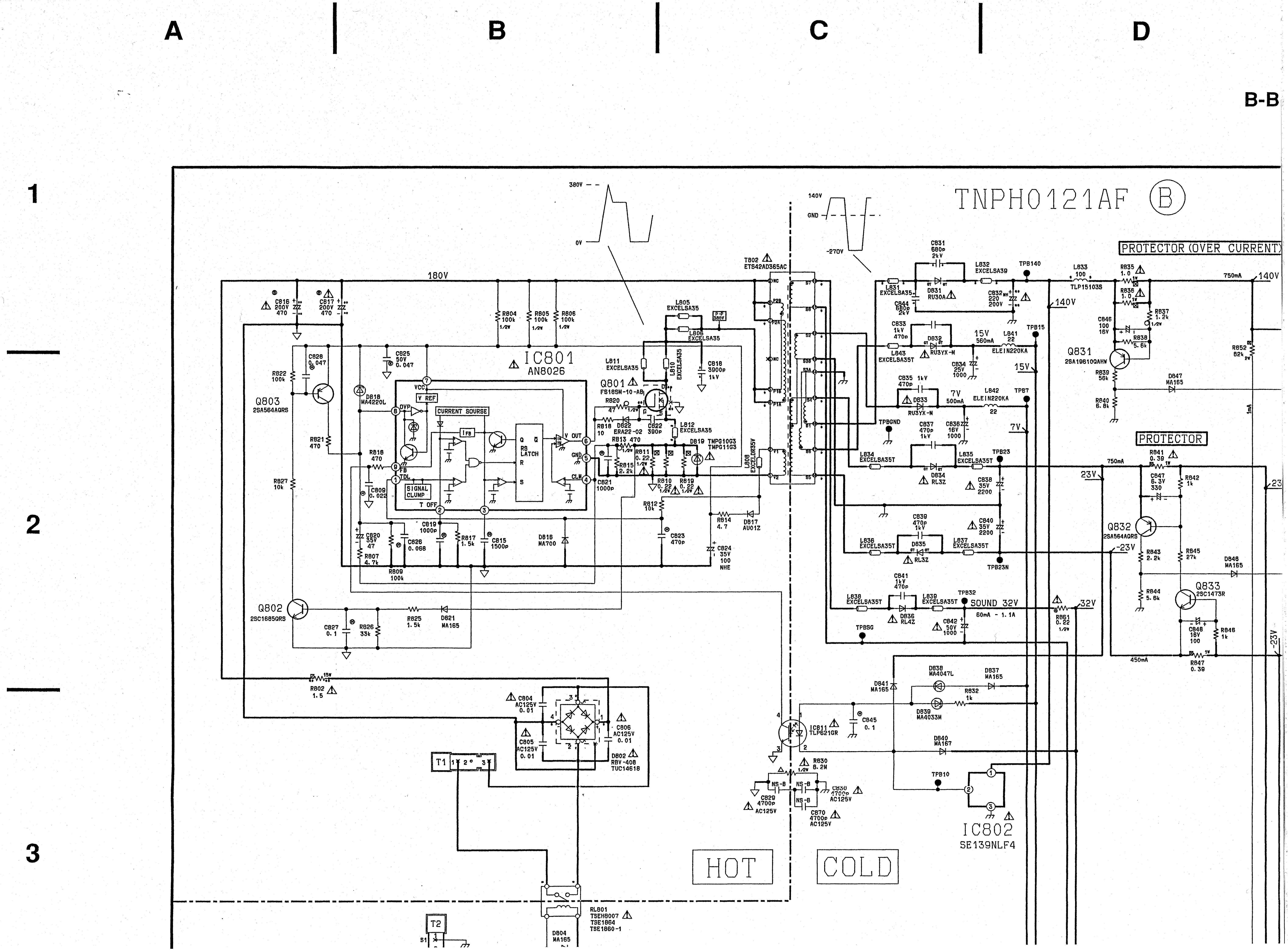
CHIP TRANSISTOR LEAD DESIGNATION



MTC9903012C1

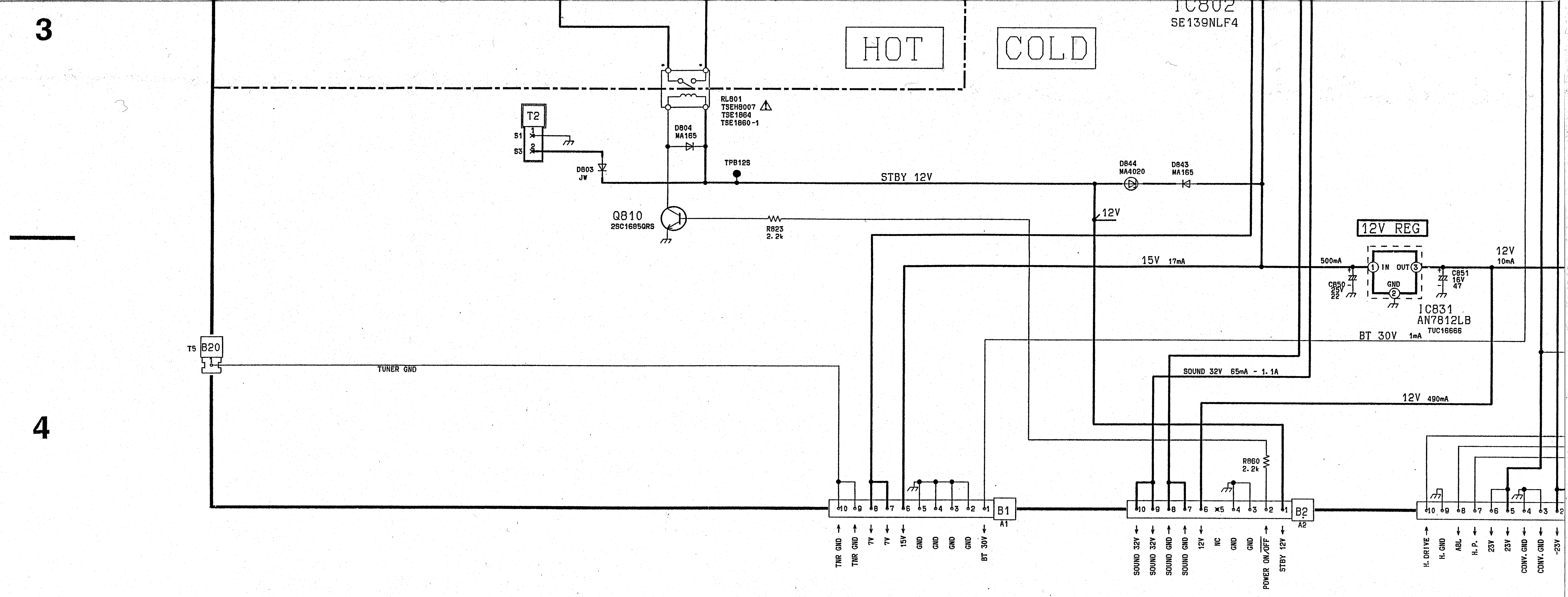
Sheet 2 of 5
Side B

C-Board Schematic,
Voltages & Layout
PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA



A
B
C
D
B-B
1
2
3
TNPH0121AF (B)
PROTECTOR (OVER CURRENT)
PROTECTOR
HOT
COLD
380V
0V
140V
GND
-270V
180V
T802 ⚠
ETS42AD365AC
IC801 ⚠
AN8026
VCC
V REF
OVP
CURRENT SOURSE
IFB
RS LATCH
Q
R
S
V OUT
GND
CLM
FB
TDL
SIGNAL CLUMP
T OFF
Q801 ⚠
FS16SM-10-AB
Q802
2SC1685QRS
Q803
2SA564AQRS
Q831
2SA1961OQAHW
Q832
2SA564AQRS
Q833
2SC1473R
IC811 ⚠
TLP621GR
IC802
SE139NLF4
D802 ⚠
RBV-408
TUC14618
RL801
TSE8007 ⚠
TSE1864
TSE1860-1
D804
MA165
T1
T2
S1
C816 200V 470
C817 200V 470
C825 50V 0.047
C828 0.047
C809 0.022
C815 1500p
C818 3900p 1kV
C819 1000p
C820 35V 47
C821 1000p
C822 390p
C823 470p
C824 35V 100 NHE
C826 0.068
C827 0.1
C804 AC125V 0.01
C805 AC125V 0.01
C806 AC125V 0.01
C829 4700p AC125V
C830 4700p AC125V
C870 4700p AC125V
C831 680p 2kV
C832 220 200V
C833 1kV 470p
C834 25V 1000
C835 1kV 470p
C836 16V 1000
C837 470p 1kV
C838 35V 2200
C839 470p 1kV
C840 35V 2200
C841 1kV 470p
C842 50V 1000
C844 680p 2kV
C845 0.1
C846 100 16V
C847 6.3V 330
C848 16V 100
R802 1.5 15W
R804 100k 1/2W
R805 100k 1/2W
R806 100k 1/2W
R807 4.7k
R809 100k
R810 0.22 1/2W
R811 0.22 1/2W
R812 10k
R813 470
R814 4.7
R815 2.2k
R816 470
R817 1.5k
R818 10
R819 0.22 1/2W
R820 47 1/2W
R821 470
R822 100k
R825 1.5k
R826 33k
R827 10k
R830 8.2M 1/2W
R832 1k
R835 1.0 1W
R836 1.0 1W
R837 1.2k 1/2W
R838 5.6k
R839 56k
R840 6.8k
R841 0.39 1W
R842 1k
R843 2.2k
R844 5.6k
R845 27k
R846 1k
R847 0.39 1W
R851 0.22 1/2W
R852 82k 2W
D816 MA700
D817 AU01Z
D818 MA4220L
D819 TMPG10G3 TMPG11G3
D821 MA165
D822 ERA22-02
D831 RU30A ⚠
D832 RU3YX-M
D833 RU3YX-N
D834 RL3Z
D835 RL3Z
D836 RL4Z
D837 MA165
D838 MA4047L
D839 MA4033M
D840 MA167
D841 MA165
D847 MA165
D848 MA165
L805 EXCELSA35
L806 EXCELSA35
L808 EXCELDR35V
L810 EXCELSA35
L811 EXCELSA35
L812 EXCELSA35
L831 EXCELSA35
L832 EXCELSA39
L833 100 TLP15103S
L834 EXCELSA35T
L835 EXCELSA35T
L836 EXCELSA35T
L837 EXCELSA35T
L838 EXCELSA35T
L839 EXCELSA35T
L841 22 ELEIN220KA
L842 ELEIN220KA 22
L843 EXCELSA35T
P-P 380V
TPB140
TPB15
TPB7
TPBGND
TPB23
TPB23N
TPB32
TPBSG
TPB10
140V
750mA
15V 560mA
15V
7V 500mA
7V
23V
-23V
SOUND 32V
60mA - 1.1A
32V
1mA
450mA
NS-B

012C1


3
4
IC802
SE139NLF4
HOT
COLD
RL801
TSEH8007 ⚠
TSE1864
TSE1860-1
T2
S1
S3
D804
MA165
TPB12S
D803
JW
STBY 12V
D844
MA4020
D843
MA165
12V
Q810
2SC1685QRS
R823
2.2k
12V REG
IN
OUT
GND
15V 17mA
500mA
C850
25V
22
C851
16V
47
12V
10mA
IC831
AN7812LB
TUC16666
BT 30V 1mA
T5
B20
TUNER GND
SOUND 32V 65mA - 1.1A
12V 490mA
R860
2.2k
B1
A1
B2
A2
TNR GND
TNR GND
7V
7V
15V
GND
GND
GND
GND
BT 30V
SOUND 32V
SOUND 32V
SOUND GND
SOUND GND
12V
NC
GND
GND
POWER ON/OFF
STBY 12V
H. DRIVE
H. GND
ABL
H.P.
23V
23V
CONV. GND
CONV. GND
-23V

5

Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V.
   - NTSC (HD 1125I & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
   - TV ANT/CABLE (Set Up Menu) in TV ANT Mode.
   - Volume - Min.
   - TV/Video SW - TV position.
   - Audio Mode - Stereo.
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

Schematic Notes

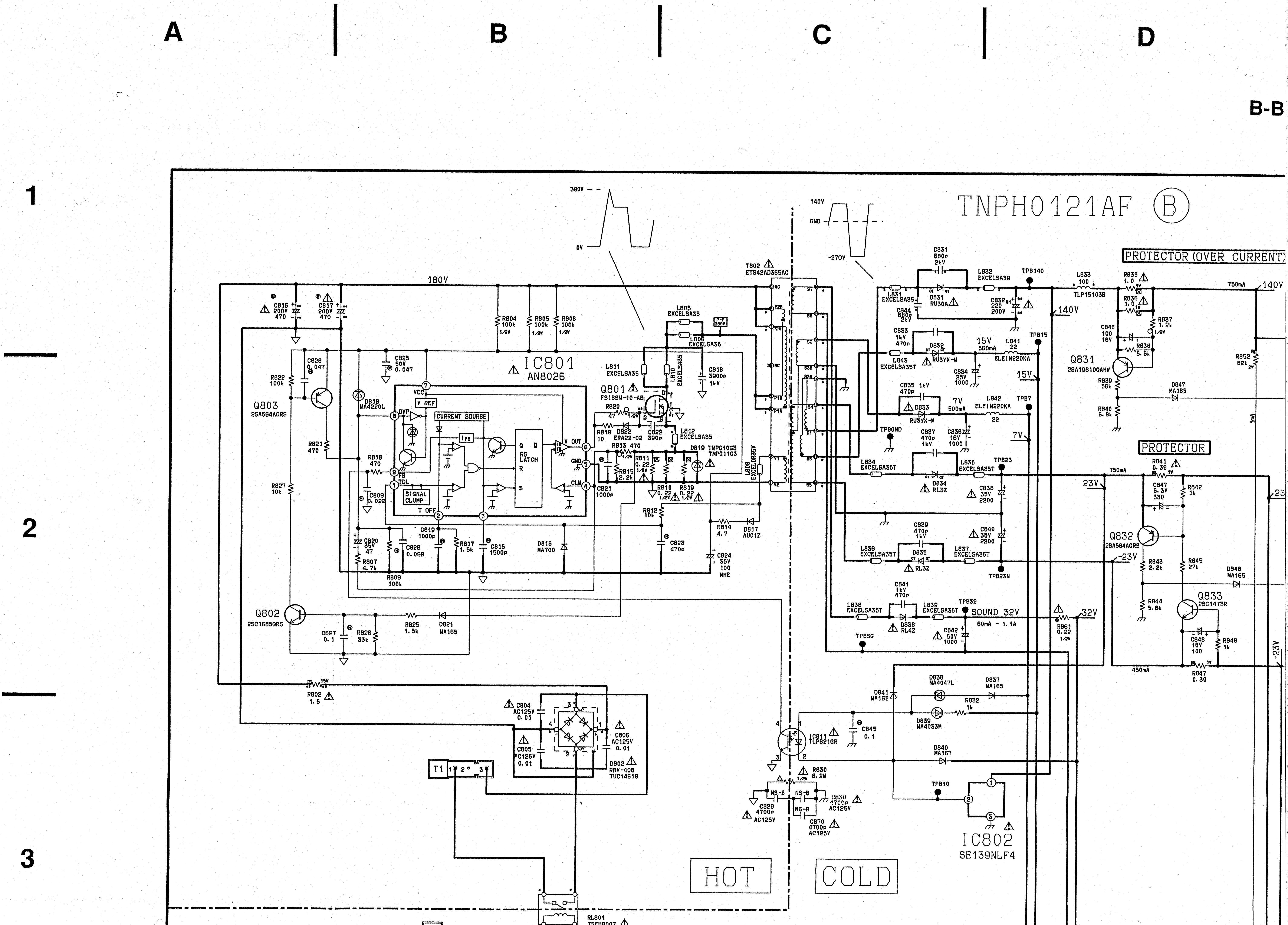
1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ●. Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (BOLD LINE) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION.** ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

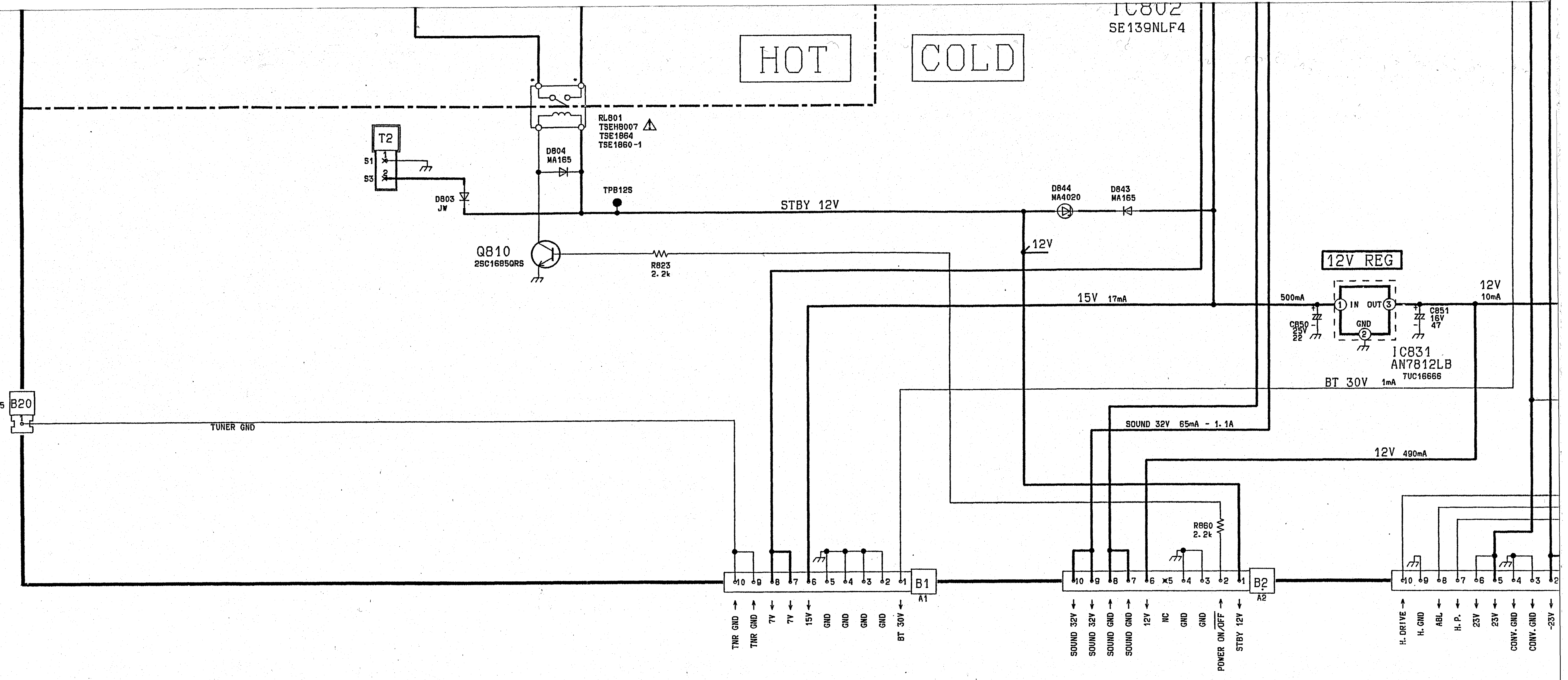
Waveform Measurements

1. ③ Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to MIN.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ show
waveform number indicate
ground lead connection
Oscilloscope.

*CAUTION: Incorrect
connection of the test equipm
result in erroneous readings.*


A
B
C
D
B-B
1
2
3
TNPH0121AF (B)
PROTECTOR (OVER CURRENT)
PROTECTOR
IC801
AN8026
Q801
FS16SM-10-AB
Q802
2SC1685QRS
Q803
2SA564AQRS
Q831
2SA1096100AHW
Q832
2SA564AQRS
Q833
2SC1473R
IC802
SE139NLF4
IC811
TLP621GR
T802
ETS42AD365AC
D802
RBV-408
TUC14618
RL801
180V
380V
0V
140V
GND
-270V
15V
7V
23V
-23V
SOUND 32V
32V
750mA
450mA
60mA - 1.1A
560mA
500mA
CURRENT SOURSE
SIGNAL CLUMP
RS LATCH
V REF
OVP
VCC
OUT
GND
CLM
FB
TDL
T OFF
HOT
COLD
TPB140
TPB15
TPB7
TPB23
TPB23N
TPB32
TPBGND
TPBSG
TPB10
T1

3


IC802
SE139NLF4
HOT
COLD
RL801
TSEH8007 ⚠
TSE1864
TSE1860-1
T2
S1
S3
D804
MA165
D803
JW
TPB12S
STBY 12V
D844
MA4020
D843
MA165
12V
Q810
2SC1685QRS
R823
2.2k
12V REG
15V 17mA
500mA
IN OUT
GND
C850
25V
22
C851
16V
47
IC831
AN7812LB
TUC16666
12V
10mA
BT 30V 1mA
T5
B20
TUNER GND
SOUND 32V 65mA - 1.1A
12V 490mA
R860
2.2k
B1
A1
B2
A2
TNR GND
TNR GND
7V
7V
15V
GND
GND
GND
GND
BT 30V
SOUND 32V
SOUND 32V
SOUND GND
SOUND GND
12V
NC
GND
GND
POWER ON/OFF
STBY 12V
H. DRIVE
H. GND
ABL
H. P.
23V
23V
CONV. GND
CONV. GND
-23V

4

5

Voltage Measurements

1. Voltage measurement:
   AC input to the Receiver is 120V. NTSC (HD: 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   All Picture and Audio adjustments are set to Normalize.
   TV ANT/CABLE - (Set Up Menu) in TV ANT Mode.
   Volume - Min.
   TV/Video S.W. - TV position.
   Audio Mode - Stereo.
   Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.
   CAUTION: Incorrect ground connection of the test equipment will result in erraneous readings.

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ●. Test point but no pin ○.
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NOTE: All other component symbols are used for engineering design purposes.

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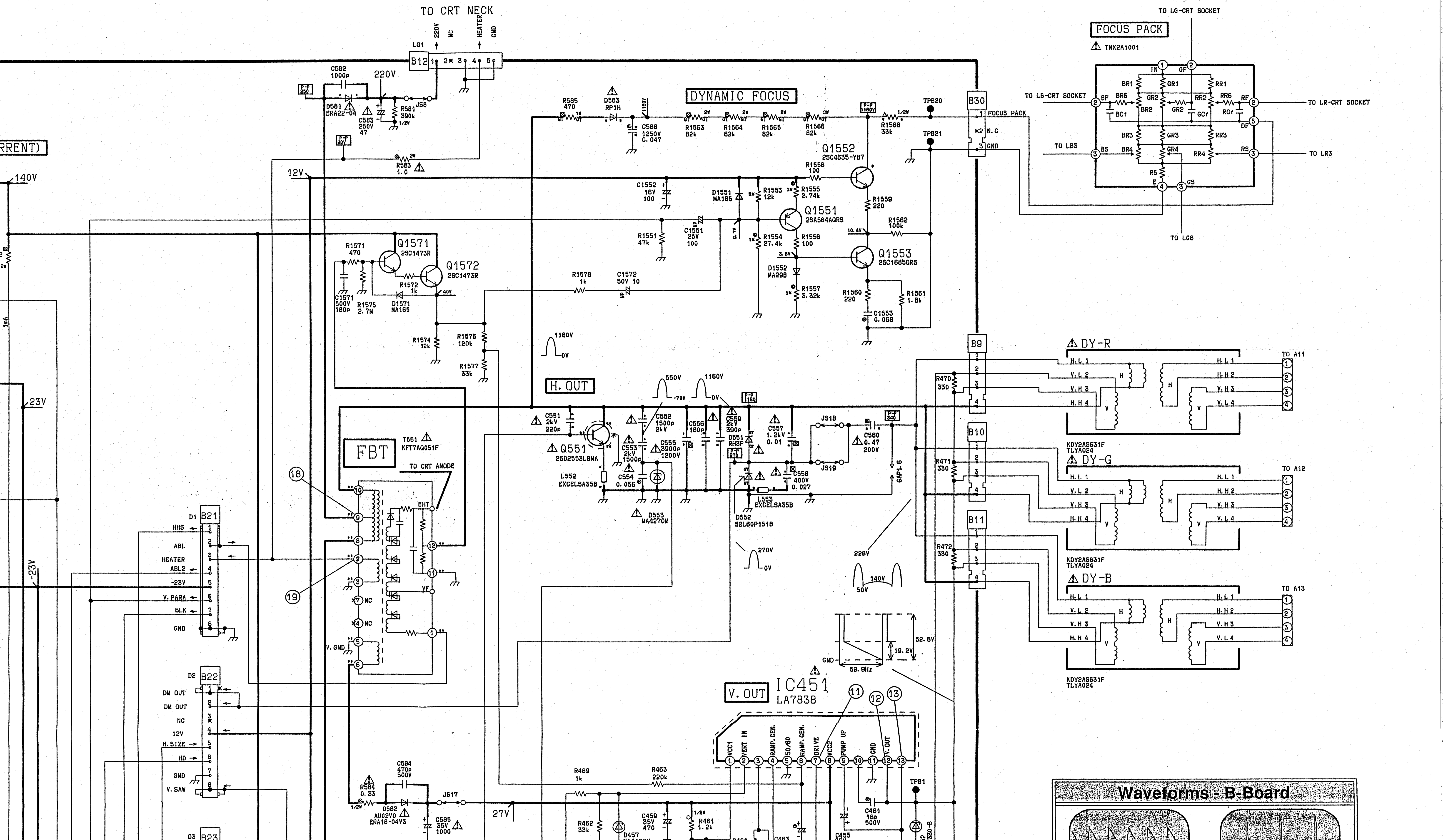
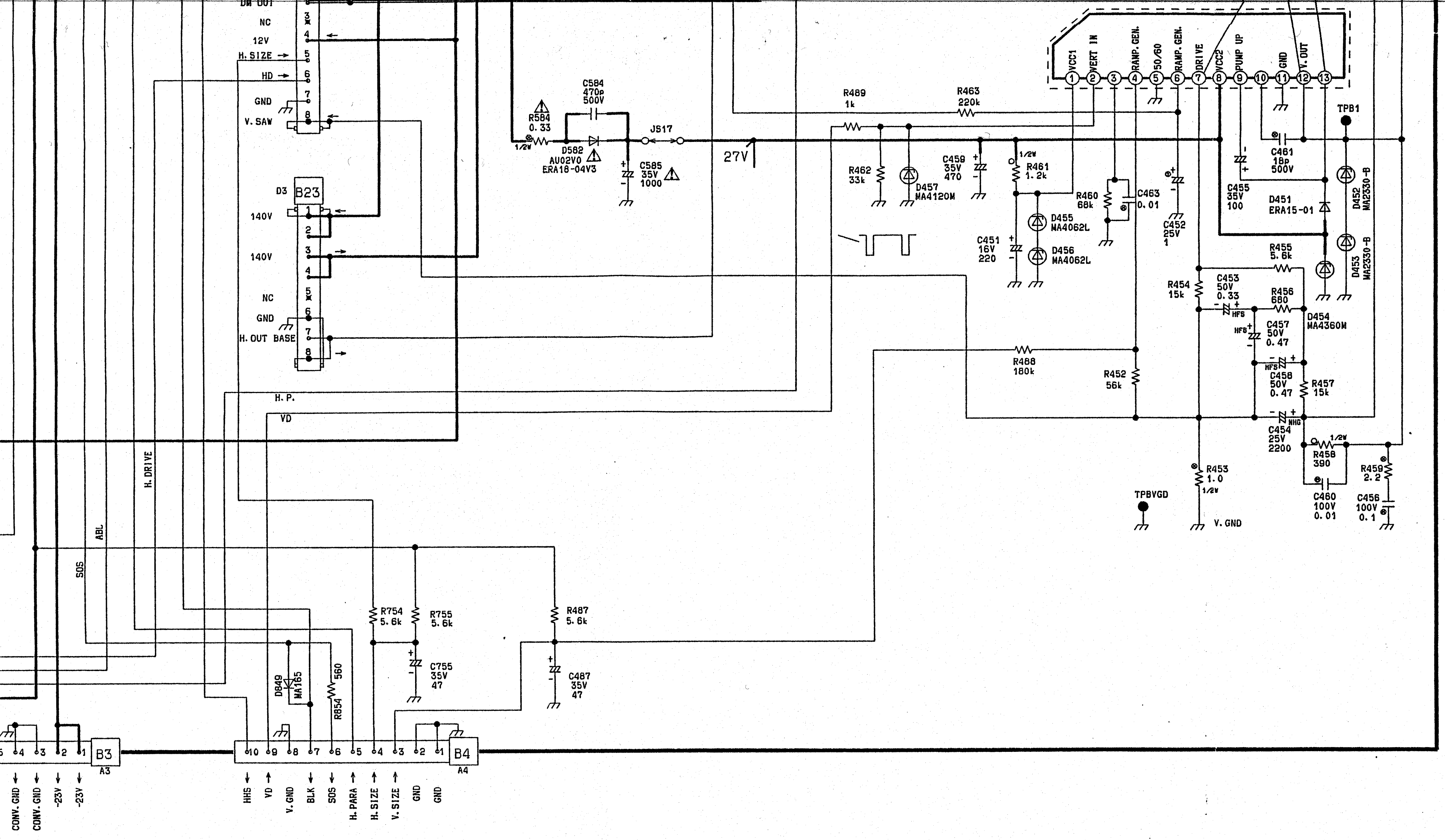
1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors; 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to MIN.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ show waveform number indicate ground lead connection Oscilloscope.
   CAUTION: Incorrect connection of the test equipm esult in erroneous readings.

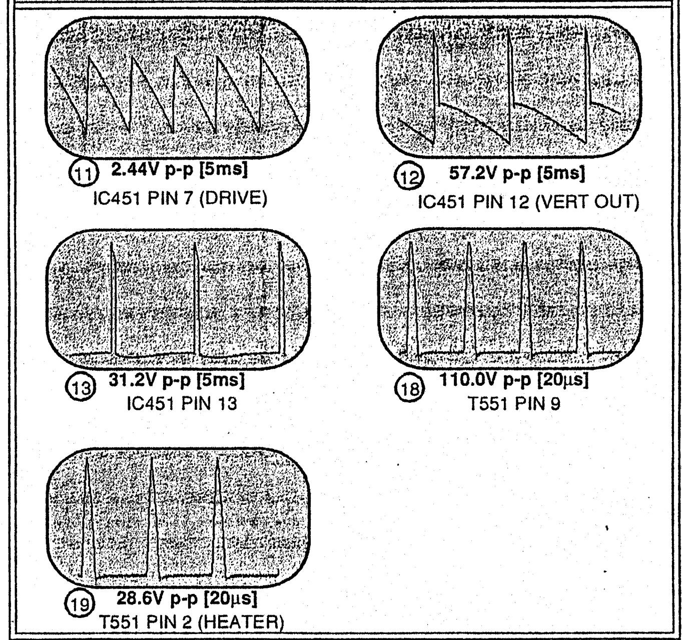
B-Board Schematic


TO CRT NECK
220V
NC
HEATER
GND
LG1
B12
C582 1000p
220V
D581 ERA22-04
C583 250V 47
R581 390k 1/2W
J58
R583 1.0 2W
12V
140V
RRENT)
R585 470
D583 RP1H
1160V
C586 1250V 0.047
DYNAMIC FOCUS
R1563 82k
R1564 82k
R1565 82k
R1566 82k
R1568 33k 1/2W
TPB20
TPB21
B30
FOCUS PACK
N.C
GND
Q1552 2SC4635-YB7
R1558 100
C1552 16V 100
D1551 MA165
R1553 12k
R1555 2.74k
Q1551 2SA564AQRS
R1559 220
R1562 100k
10.4V
R1551 47k
C1551 25V 100
R1554 27.4k
R1556 100
3.8V
Q1553 2SC1685QRS
D1552 MA29B
R1557 3.32k
R1560 220
R1561 1.8k
C1553 0.068
Q1571 2SC1473R
Q1572 2SC1473R
R1571 470
R1572 1k
D1571 MA165
C1571 500V 180p
R1575 2.7M
40V
R1578 1k
C1572 50V 10
R1574 12k
R1576 120k
R1577 33k
1160V 0V
H.OUT
550V -70V
1160V 0V
C551 2kV 220p
Q551 2SD2553LBNA
C552 1500p 2kV
C553 2kV 1500p
C555 3900p 1200V
C556 180p
C559 2kV 390p
D551 RH3F
C557 1.2kV 0.01
JS18
JS19
C560 0.47 200V
GAP1.6
C554 0.056
L552 EXCELSA35B
D553 MA4270M
L553 EXCELSA35B
C558 400V 0.027
D552 S2L60P1518
270V 0V
226V
140V 50V
52.8V
19.2V
GND
59.9Hz
FBT
T551 KFT7AQ051F
TO CRT ANODE
EHT
VF
NC
V.GND
18
19
D1 B21
HHS
ABL
HEATER
ABL2
-23V
V.PARA
BLK
GND
D2 B22
DM OUT
DM OUT
NC
12V
H.SIZE
HD
GND
V.SAW
D3 B23
23V
-23V
C584 470p 500V
R584 0.33 1/2W
D582 AU02V0 ERA18-04V3
J517
C585 35V 1000
27V
R489 1k
R463 220k
R462 33k
C459 35V 470
R461 1.2k 1/2W
D457
C463
C455
C461 18p 500V
TPB1
V.OUT
IC451 LA7838
11
12
13
VCC1
VERT IN
RAMP. GEN.
50/60
RAMP. GEN.
DRIVE
VCC2
PUMP UP
GND
V.OUT
FOCUS PACK
TNX2A1001
TO LG-CRT SOCKET
TO LB-CRT SOCKET
TO LR-CRT SOCKET
TO LB3
TO LR3
TO LG8
IN
GF
BF
RF
DF
BS
RS
E
GS
BR1 BR6 BR2 BR3 BR4 R5
GR1 GR2 GR3 GR4
RR1 RR2 RR6 RR3 RR4
BCf GCf RCf
B9
B10
B11
R470 330
R471 330
R472 330
DY-R
DY-G
DY-B
H.L 1
V.L 2
V.H 3
H.H 4
H.H 2
V.H 3
V.L 4
H
V
TO A11
TO A12
TO A13
KDY2AS631F TLYA024

Waveforms - B-Board


DM OUT
NC
12V
H. SIZE
HD
GND
V. SAW
D3
B23
140V
140V
NC
GND
H. OUT BASE
H. P.
VD
H. DRIVE
ABL
SOS
R584 0.33
C584 470p 500V
D582 AU02V0 ERA18-04V3
J517
C585 35V 1000
27V
R489 1k
R463 220k
R462 33k
D457 MA4120M
C459 35V 470
R461 1.2k
R460 68k
C463 0.01
C452 25V 1
C451 16V 220
D455 MA4062L
D456 MA4062L
VCC1
VERT IN
RAMP. GEN.
50/60
RAMP. GEN.
DRIVE
VCC2
PUMP UP
GND
V. OUT
TPB1
C461 18p 500V
C455 35V 100
D451 ERA15-01
D452 MA2330-B
D453 MA2330-B
R455 5.6k
R454 15k
C453 50V 0.33
R456 680
D454 MA4360M
C457 50V 0.47
R488 180k
R452 56k
C458 50V 0.47
R457 15k
C454 25V 2200
R458 390
R459 2.2
R453 1.0
C460 100V 0.01
C456 100V 0.1
TPBVGD
V. GND
R754 5.6k
R755 5.6k
R487 5.6k
C755 35V 47
C487 35V 47
D849 MA165
R854 560
B3
A3
B4
A4
CONV. GND
CONV. GND
-23V
-23V
HHS
VD
V. GND
BLK
SOS
H. PARA
H. SIZE
V. SIZE
GND
GND

Waveforms - B-Board



B-Board Voltage Measurements (ICs & Transistors)

IC451	
1	12.20
2	3.93
3	6.06
4	6.25
5	GND
6	5.91
7	6.00
8	27.40
9	1.64
10	1.47
11	GND
12	14.20
13	27.40

IC801 ⏚	
1	1.12
2	0.33
3	0.16
4	0.13
5	GND
6	7.63
7	23.30
8	6.11
9	6.07

IC802	
1	138.30
2	10.40
3	GND

IC811	
1	11.30
2	10.30
3⏚	GND
4⏚	6.00

IC831	
1	14.80
2	GND
3	11.80

	Q801 ⏚
S	0.07
D	-14.90
G	7.27

	Q551	Q802 ⏚	Q803 ⏚	Q810
B	-0.08	0.04	23.10	0.80
C	136.10	23.00	6.32	0.14
E	GND	GND	23.30	GND

	Q831	Q832	Q833	Q1551
B	137.90	22.90	-23.70	8.32
C	0.00	0.00	22.90	4.10
E	138.20	23.10	-23.90	8.96

	Q1552	Q1553	Q1571	Q1572
B	11.80	4.00	38.00	41.10
C	381.80	10.80	137.90	137.90
E	11.30	3.39	41.10	40.60

l ⏚ shown on
er indicates (Hot)
onnection of the

orrect ground
est equipment will
readings.

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

Boards Designation

- A-Board - Main Chassis
- B-Board - Power Supply
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- K-Board - Customer Controls
- LB/LG/LR-Board - Blue, Green & Red CRT Boards
- R-Board - Remote Sensor
- S-Board - 2nd Tuner
- T-Board - Line Filter
- X-Board - AV Inputs
- Y-Board - PIP Processing
- YC-Board - Digital 3-line Comb Filter

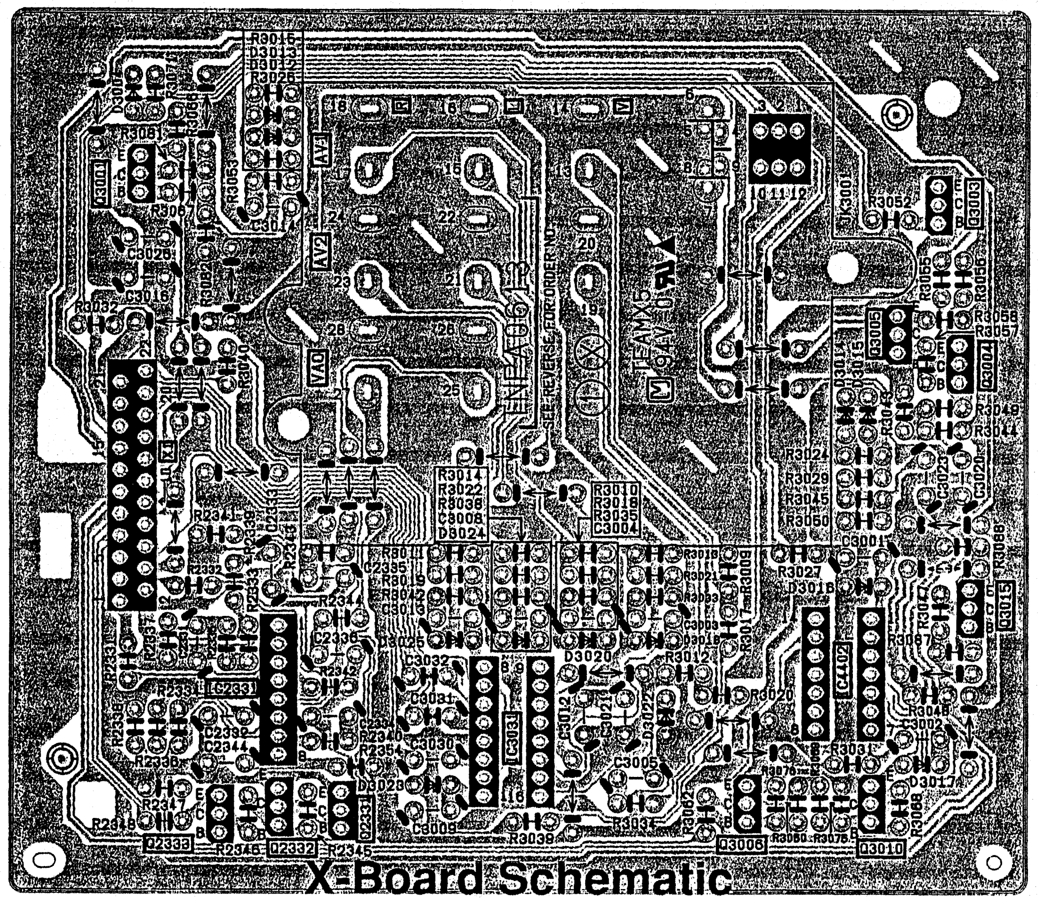
A B C D

1

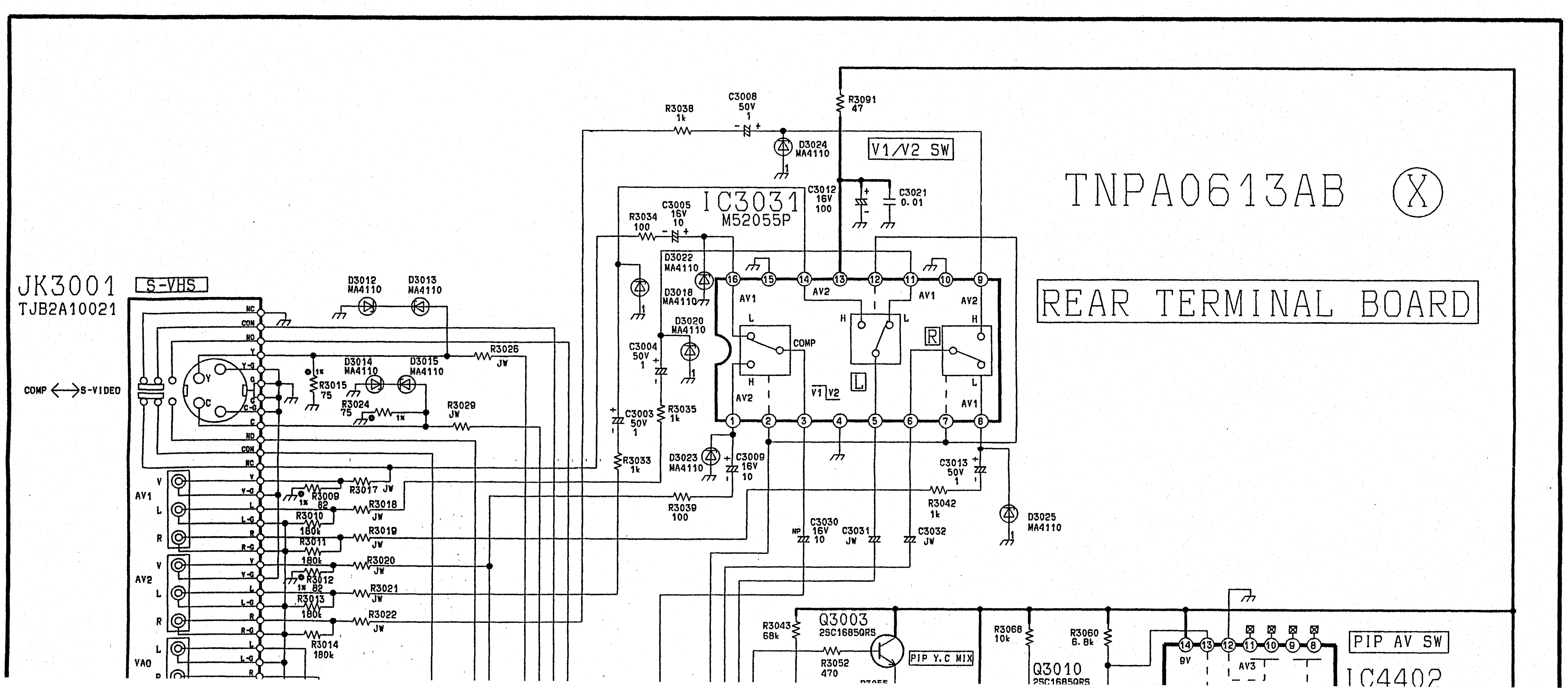
2

3

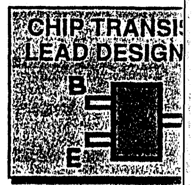
X-Board (TNPA0613)



X-Board Schematic



TNPA0613AB
X
REAR TERMINAL BOARD
JK3001
TJB2A10021
S-VHS
COMP ⟷ S-VIDEO
IC3031
M52055P
V1/V2 SW
PIP Y.C MIX
PIP AV SW
IC4402
Q3003
2SC1685QRS
Q3010
2SC1685QRS
R3091 47
R3038 1k
C3008 50V 1
D3024 MA4110
C3012 16V 100
C3021 0.01
C3005 16V 10
R3034 100
D3022 MA4110
D3018 MA4110
D3020 MA4110
C3004 50V 1
C3003 50V 1
R3035 1k
R3033 1k
D3023 MA4110
C3009 16V 10
R3039 100
C3030 16V 10
C3031 JW
C3032 JW
C3013 50V 1
R3042 1k
D3025 MA4110
D3012 MA4110
D3013 MA4110
D3014 MA4110
D3015 MA4110
R3026 JW
R3015 75
R3024 75
R3029 JW
R3017 JW
R3009 82
R3018 JW
R3010 180k
R3019 JW
R3011 180k
R3020 JW
R3012 82
R3021 JW
R3013 180k
R3022 JW
R3014 180k
R3043 68k
R3052 470
R3068 10k
R3060 6.8k
AV1
AV2
VAO
COMP
AV3

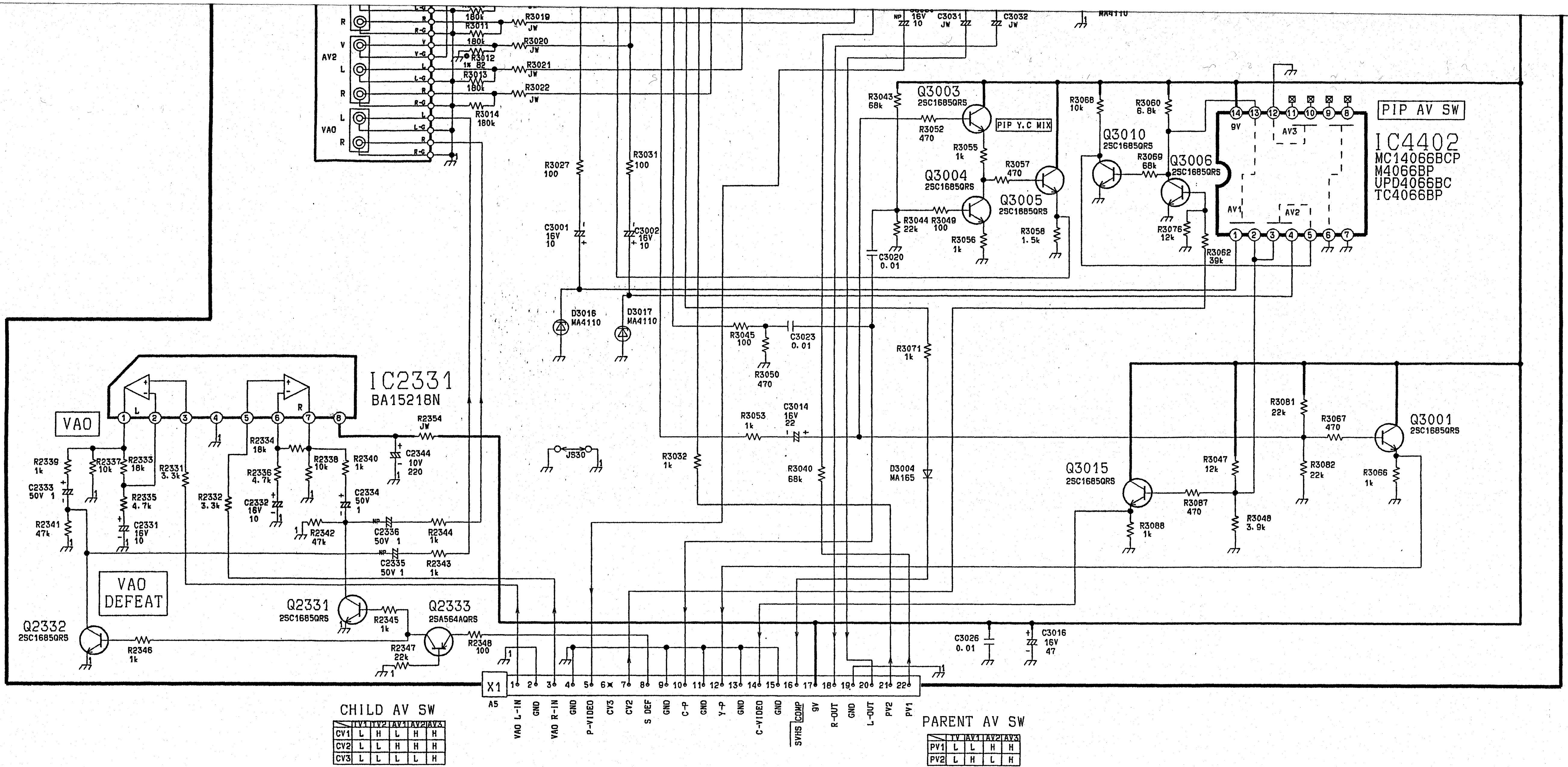


CHIP TRANSIS
LEAD DESIGN
B
E

3

4

5


AV2
VAO
R
V
L
R3011
R3012
R3013
R3014
180k
R3019
R3020
R3021
R3022
JW
R3027
100
R3031
100
C3001
16V
10
C3002
16V
10
D3016
MA4110
D3017
MA4110
Q3003
2SC1685QRS
PIP Y,C MIX
R3043
68k
R3052
470
R3055
1k
Q3004
2SC1685QRS
R3057
470
Q3005
2SC1685QRS
R3044
22k
R3049
100
R3056
1k
R3058
1.5k
C3020
0.01
R3068
10k
R3060
6.8k
Q3010
2SC1685QRS
R3069
68k
Q3006
2SC1685QRS
R3076
12k
R3062
39k
9V
AV1
AV2
AV3
PIP AV SW
IC4402
MC14066BCP
M4066BP
UPD4066BC
TC4066BP
R3045
100
C3023
0.01
R3050
470
R3071
1k
R3053
1k
C3014
16V
22
R3040
68k
D3004
MA165
R3032
1k
JS30
IC2331
BA15218N
L
R
R2354
JW
C2344
10V
220
R2339
1k
R2337
10k
R2333
18k
R2331
3.3k
R2334
18k
R2338
10k
R2340
1k
R2336
4.7k
C2333
50V 1
R2335
4.7k
R2332
3.3k
C2332
16V
10
C2334
50V
1
R2341
47k
C2331
16V
10
R2342
47k
C2336
50V 1
R2344
1k
C2335
50V 1
R2343
1k
VAO DEFEAT
Q2331
2SC1685QRS
R2345
1k
Q2333
2SA564AQRS
R2347
22k
R2348
100
Q2332
2SC1685QRS
R2346
1k
Q3001
2SC1685QRS
R3081
22k
R3067
470
R3082
22k
R3066
1k
Q3015
2SC1685QRS
R3047
12k
R3087
470
R3048
3.9k
R3088
1k
C3026
0.01
C3016
16V
47
X1
A5
VAO L-IN
GND
VAO R-IN
GND
P-VIDEO
CV3
CV2
S DEF
GND
C-P
GND
Y-P
GND
C-VIDEO
GND
SVHS COMP
9V
R-OUT
GND
L-OUT
PV2
PV1

CHILD AV SW

	TV1	TV2	AV1	AV2	AV3
CV1	L	H	L	H	H
CV2	L	L	H	H	H
CV3	L	L	L	L	H

PARENT AV SW

	TV	AV1	AV2	AV3
PV1	L	L	H	H
PV2	L	H	L	H

X-Board Voltage Measurements (ICs & Transistors)

IC2331	
1	3.66
2	3.66
3	3.66
4	GND
5	3.67
6	3.67
7	3.67
8	8.83

IC3031	
1	4.46
2	0.12
3	3.02
4	GND
5	3.02
6	3.01
7	0.12
8	4.45
9	4.45
10	GND
11	4.45
12	0.12
13	8.52
14	4.45
15	GND
16	4.45

IC4402	
1	2.15
2	2.15
3	2.15
4	0.04
5	0.00
6	GND
7	GND
8	n.c
9	n.c
10	n.c
11	n.c
12	GND
13	8.08
14	8.84

	Q2331	Q2332	Q2333
B	0.48	0.48	0.04
C	0.00	0.00	0.49
E	GND	GND	0.51

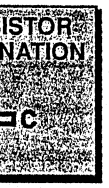
	Q3001	Q3003	Q3004
B	4.17	4.15	2.03
C	8.83	8.83	2.14
E	3.50	3.52	1.38

	Q3005	Q3006	Q3010
B	2.14	0.02	0.67
C	8.83	8.08	0.00
E	1.50	GND	GND

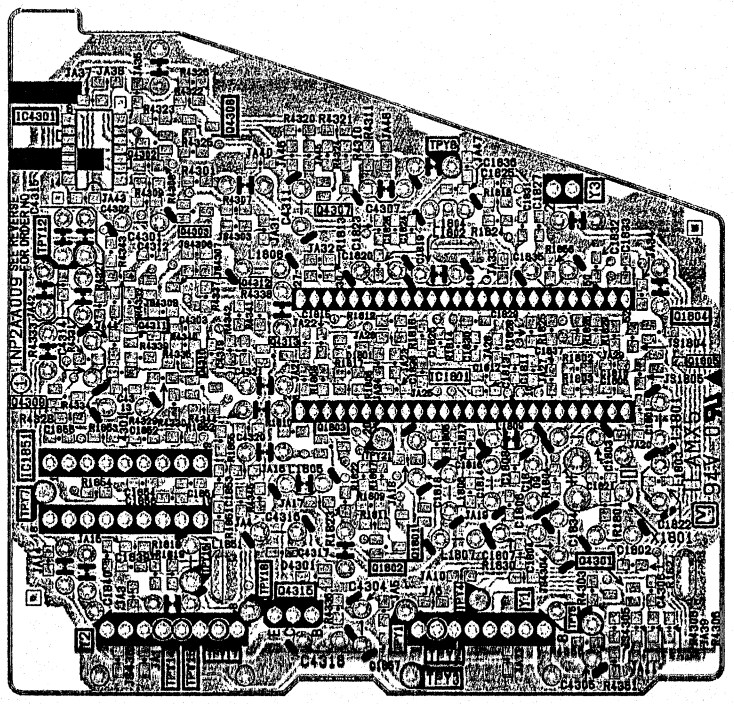
	Q3015
B	2.15
C	8.84
E	1.49

IMPORTAN

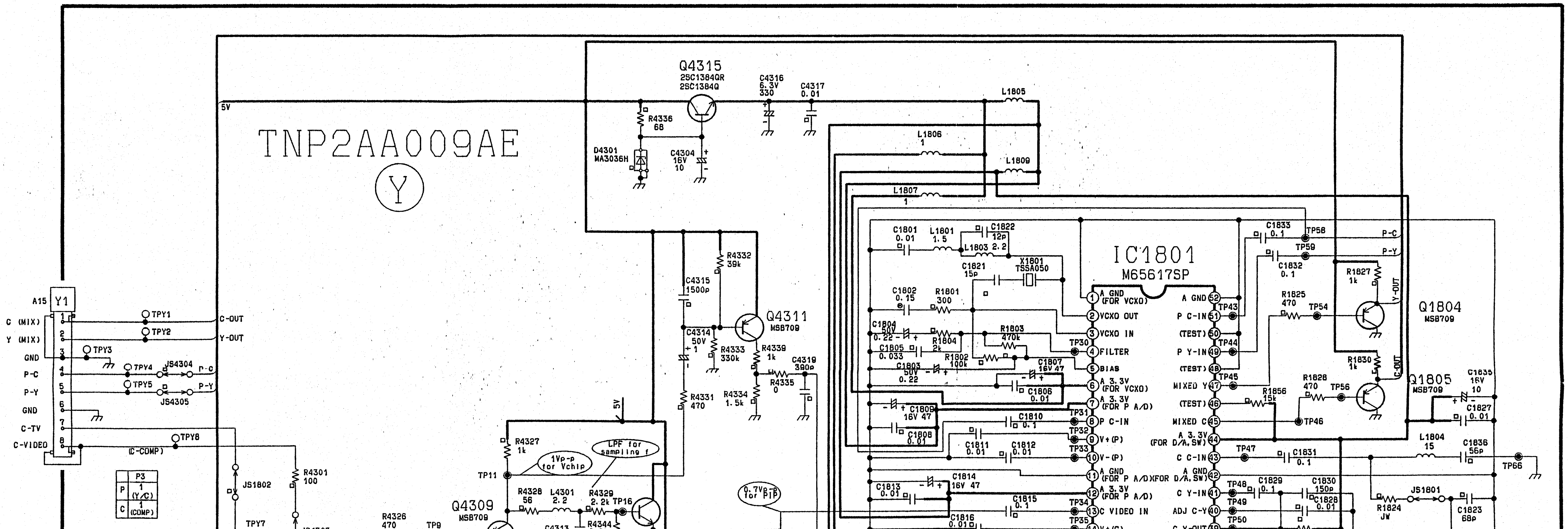
THIS SCHEMATIC DIAGRAM
THAT ARE IMPORTANT FOR
AND ELECTRICAL SHOCK
ESSENTIAL THAT ONLY MA
USED FOR THE CRITICAL CO
THE SCHEMATIC

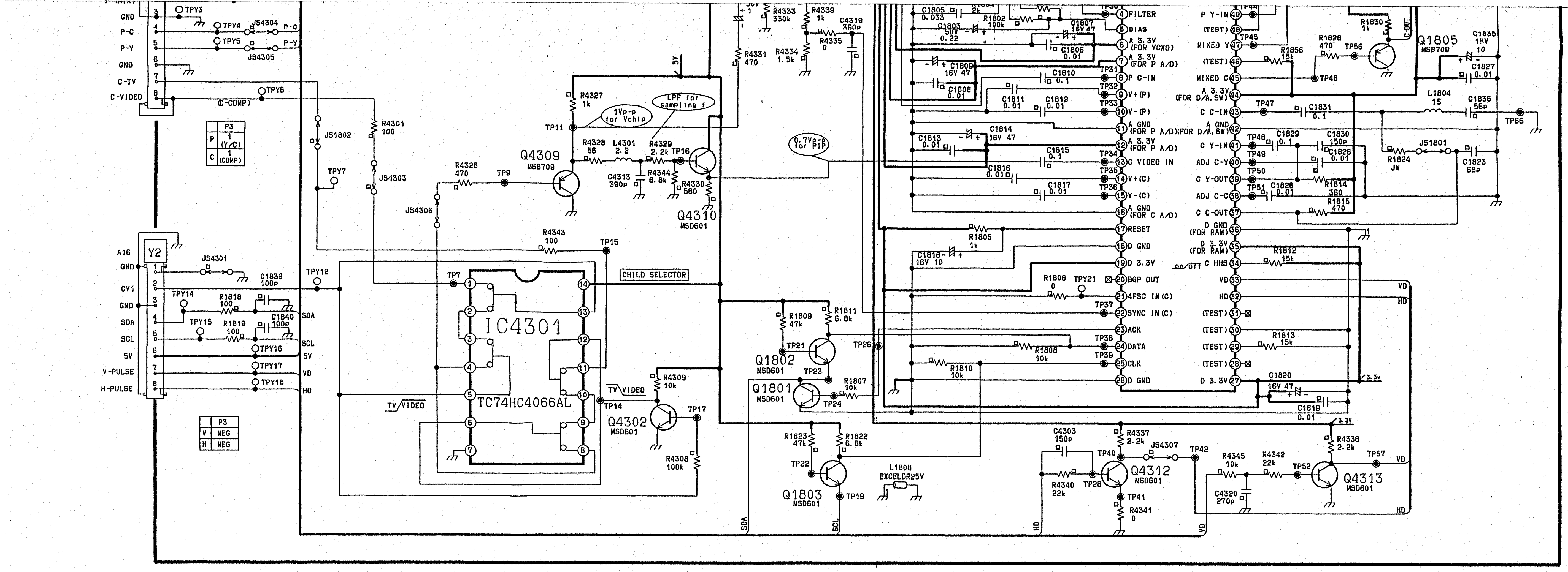

ISTOR
NATION
C

Y-Board (TNP2AA009)



Y-Board Schematic


TNP2AA009AE
Y
5V
Q4315
2SC1384QR
2SC1384Q
R4336
68
D4301
MA3036H
C4304
16V
10
C4316
6.3V
330
C4317
0.01
L1805
L1806
1
L1809
L1807
1
Q4311
MSB709
R4332
39k
C4315
1500p
C4314
50V
1
R4333
330k
R4339
1k
C4319
390p
R4335
0
R4331
470
R4334
1.5k
A15
Y1
C (MIX)
Y (MIX)
GND
P-C
P-Y
GND
C-TV
C-VIDEO
TPY1
TPY2
TPY3
TPY4
TPY5
TPY8
JS4304
JS4305
C-OUT
Y-OUT
P-C
P-Y
(C-COMP)
P3
P
1
(Y/C)
C
1
(COMP)
JS1802
TPY7
R4301
100
R4327
1k
TP11
1Vp-p for Vchip
LPF for sampling f
R4328
56
L4301
2.2
R4329
2.2k
TP16
R4344
C4313
Q4309
MSB709
R4326
470
TP9
0.7Vp-p for PIP
IC1801
M65617SP
C1801
0.01
L1801
1.5
C1822
12p
L1803 2.2
X1801
TSSA050
C1821
15p
C1802
0.15
R1801
300
C1804
50V
0.22
R1804
2k
R1803
470k
C1805
0.033
C1803
50V
0.22
R1802
100k
C1807
16V 47
C1806
0.01
C1809
16V 47
C1808
0.01
C1810
0.1
C1811
0.01
C1812
0.01
C1813
0.01
C1814
16V 47
C1815
0.1
C1816
0.01
TP30
TP31
TP32
TP33
TP34
TP35
1 A GND (FOR VCXO)
2 VCXO OUT
3 VCXO IN
4 FILTER
5 BIAS
6 A 3.3V (FOR VCXO)
7 A 3.3V (FOR P A/D)
8 P C-IN
9 V+(P)
10 V-(P)
11 A GND (FOR P A/D)
12 A 3.3V (FOR P A/D)
13 C VIDEO IN
52 A GND
51 P C-IN
50 (TEST)
49 P Y-IN
48 (TEST)
47 MIXED Y
46 (TEST)
45 MIXED C
44 A 3.3V (FOR D/A, SW)
43 C C-IN
42 A GND (FOR D/A, SW)
41 C Y-IN
40 ADJ C-Y
TP43
TP44
TP45
TP46
TP47
TP48
TP49
TP50
TP54
TP56
TP58
TP59
C1833
0.1
C1832
0.1
R1827
1k
R1825
470
Q1804
MSB709
Y-OUT
C-OUT
R1830
1k
R1828
470
R1856
15k
Q1805
MSB709
C1835
16V
10
C1827
0.01
C1831
0.1
C1829
0.1
C1830
150p
C1828
0.01
L1804
15
C1836
56p
TP66
JS1801
R1824
JW
C1823
68p
P-C
P-Y


IC4301
TC74HC4066AL
CHILD SELECTOR
Q4309
MSB709
Q4310
MSD601
Q4302
MSD601
Q1801
MSD601
Q1802
MSD601
Q1803
MSD601
Q1805
MSB709
Q4312
MSD601
Q4313
MSD601
Y2
A16
GND
CV1
GND
SDA
SCL
5V
V-PULSE
H-PULSE
P-C
P-Y
C-TV
C-VIDEO
(C-COMP)
TV/VIDEO
1Vp-p for Vchip
LPF for sampling f
0.7Vp-p for PIP
L1808
EXCELDR25V
4 FILTER
5 BIAS
6 A 3.3V (FOR VCXO)
7 A 3.3V (FOR P A/D)
8 P C-IN
9 V+(P)
10 V-(P)
11 A GND (FOR P A/D)
12 A 3.3V (FOR P A/D)
13 C VIDEO IN
14 V+(C)
15 V-(C)
16 A GND (FOR C A/D)
17 RESET
18 D GND
19 D 3.3V
20 BGP OUT
21 4FSC IN(C)
22 SYNC IN(C)
23 ACK
24 DATA
25 CLK
26 D GND
P Y-IN 49
(TEST) 48
MIXED Y 47
(TEST) 46
MIXED C 45
A 3.3V (FOR D/A,SW) 44
C C-IN 43
A GND (FOR D/A,SW) 42
C Y-IN 41
ADJ C-Y 40
C Y-OUT 39
ADJ C-C 38
C C-OUT 37
D GND (FOR RAM) 36
D 3.3V (FOR RAM) 35
C HHS 34
VD 33
HD 32
(TEST) 31
(TEST) 30
(TEST) 29
(TEST) 28
D 3.3V 27
VD
HD
SDA
SCL
C-OUT

Y-Board Voltage Measurements (ICs & Transistors)

IC1801			
1	GND	27	3.30
2	1.38	28	n.c
3	1.61	29	0.00
4	1.61	30	GND
5	1.63	31	n.c
6	3.31	32	0.51
7	3.31	33	0.12
8	1.00	34	3.30
9	1.51	35	3.31
10	0.50	36	GND
11	GND	37	2.57
12	3.31	38	1.23
13	0.71	39	2.96
14	1.52	40	1.17
15	0.49	41	1.04
16	GND	42	GND
17	3.30	43	1.00
18	GND	44	3.31
19	3.30	45	1.00
20	n.c	46	3.30
21	0.00	47	0.96
22	0.17	48	GND
23	0.00	49	0.96
24	2.40	50	GND
25	2.50	51	1.00
26	GND	52	GND

IC4301	
1	1.49
2	0.00
3	0.00
4	1.53
5	0.12
6	4.85
7	GND
8	1.54
9	1.54
10	1.54
11	1.53
12	4.85
13	0.12
14	4.86

	Q1801	Q1802	Q1803
B	0.00	2.93	3.05
C	3.19	2.36	2.50
E	GND	3.21	3.23

	Q1804	Q1805	Q4302
B	0.96	1.01	0.12
C	GND	GND	4.83
E	1.64	1.68	GND

	Q4309	Q4310	Q4311
B	1.54	1.64	4.59
C	GND	4.86	0.37
E	2.21	1.00	4.86

	Q4312	Q4313	Q4315
B	0.48	0.63	3.31
C	0.51	0.12	4.85
E	0.00	GND	4.01

NT SAFETY NOTICE

M INCORPORATES SPECIAL FEATURES
PROTECTION FROM X-RADIATION, FIRE
HAZARDS. WHEN SERVICING IT IS
ANUFACTURERS SPECIFIED PARTS BE
OMPONENTS DESIGNATED WITH A ⚠ IN

MTC9903012C1

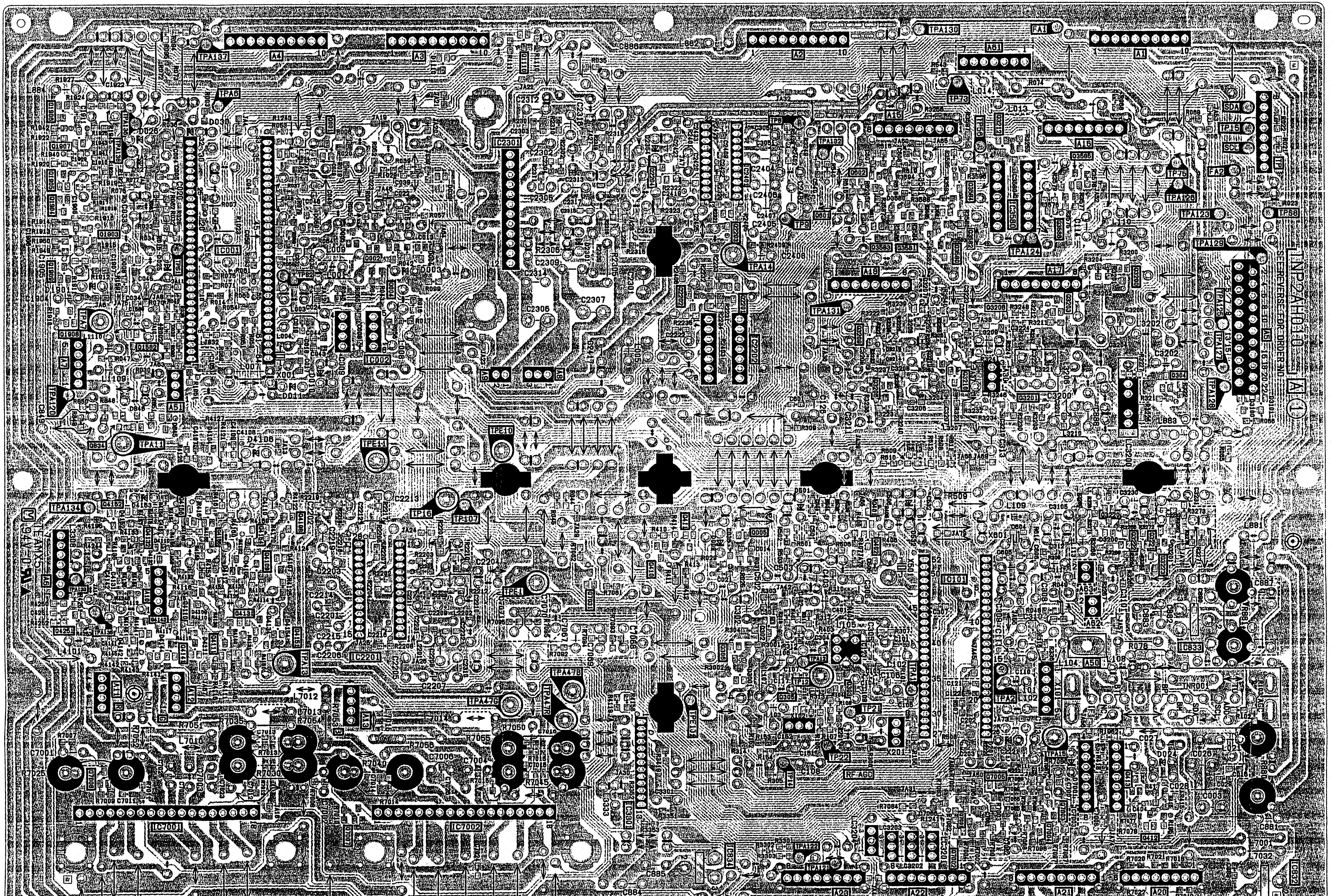
A | B | C | D

1

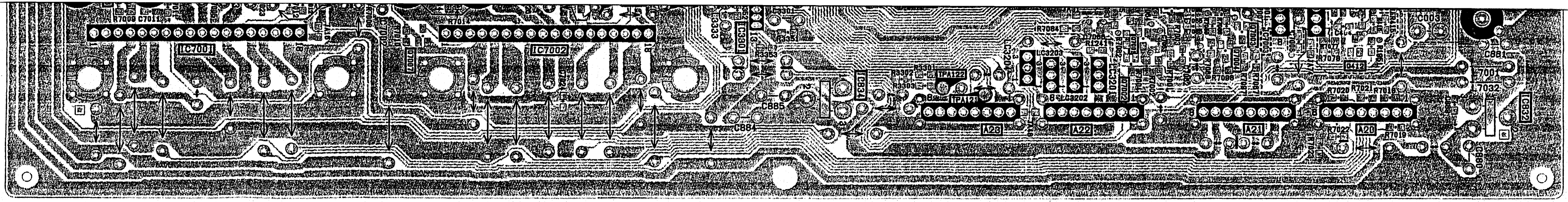
2

3

A-Board (TNP2AH010)



TNP2AH010
IC2301
IC001
IC002
IC2201
IC101
IC7001
IC7002
A1
A2
A3
A4
TPA130
TPA137



Voltage Measurements

[illegible]

AC input to the Receiver is 120V.
NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
All Picture and Audio adjustments are set to Normalize.
TV ANT/CABLE - (Set-Up Menu)
In TV/ANT Mode
Volume - Min.
TV/Video SW - TV position
Audio Mode - Stereo

and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content. Supply voltages are nominal.

2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

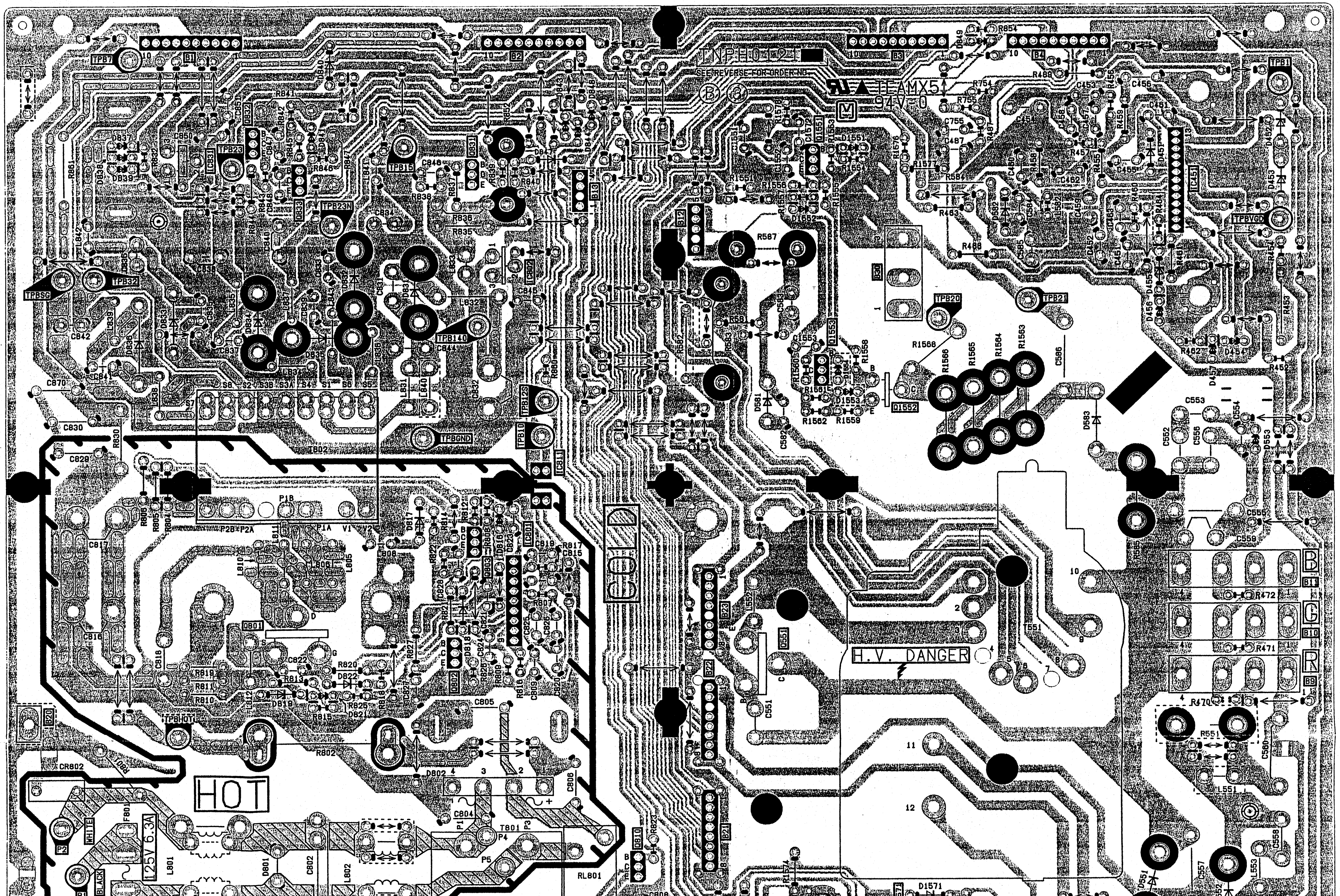
Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ●. Test point but no pin ⫯.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (BOLD LINE) Indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**. ⏚ indicates COLD GROUND.

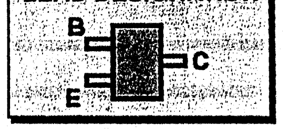
NOTE: All other component symbols are used for engineering design purposes.

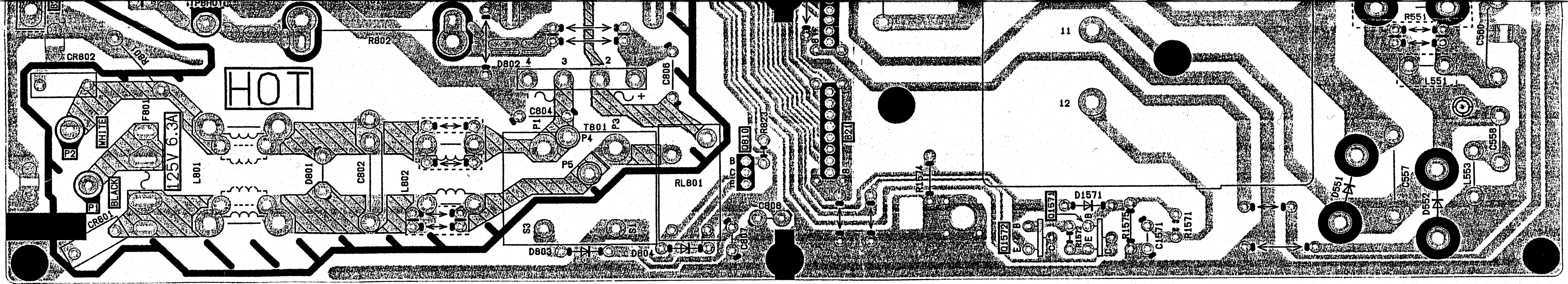
③
1. Indicates wave
(Measurement ca
best accessible
to the indicated p
2. Taken with a
generator connec
terminal. (NTSC
8 bars of EIA co
and 7.5 IRE black
3. Customer Contr
Menu) are set to
is set to MIN.
4. All video and co
taken with a wide
probe with low ca
Shape and peak
depending on
Oscilloscope use

B-Board (TNPH0121)


TNPH0121
SEE REVERSE FOR ORDER NO.
TE AMX5
94V-0
B1
B2
B3
B4
TPB7
TPB1
TPB23
TPB15
TPB23N
TPB32
TPBSG
TPB140
TPBGND
TPB20
TPB21
TPBVG
TPBHOT
COLD
HOT
H.V. DANGER
125V 6.3A
WHITE
BLACK
F801
T801
RL801
D801
CR802
R587
C586
L551
R551
R470
R471
R472
B10
B9
B
G
R

CHIP TRANSISTOR LEAD DESIGNATION




CR802
R801
R802
HOT
WHITE
F801
P2
BLACK
P1
CR801
125V 6.3A
L801
D801
C802
L802
D802
C804
T801
P3
P4
P5
C806
RL801
S3
S1
D803
D804
D810
R821
C808
C807
11
12
R1574
D1571
Q1571
Q1572
R1572
R1573
C1571
R1571
R551
C560
L551
C558
C557
D551
D552
L553

Waveform Measurements

ndicates waveform measurement.
asurement can be taken at the
accessible location in common
e indicated point.)
ent with an NTSC signal
erator connected to the antenna
inal. (NTSC color bar pattern of
ars of EIA colors, 100 IRE white
7.5 IRE black.)
mer Controls (Picture/Audio
re set to Normalize. Volume
IN".
color waveforms are
eband scope and a
citance (10 to 1)
des may vary
type of
ttings.

5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

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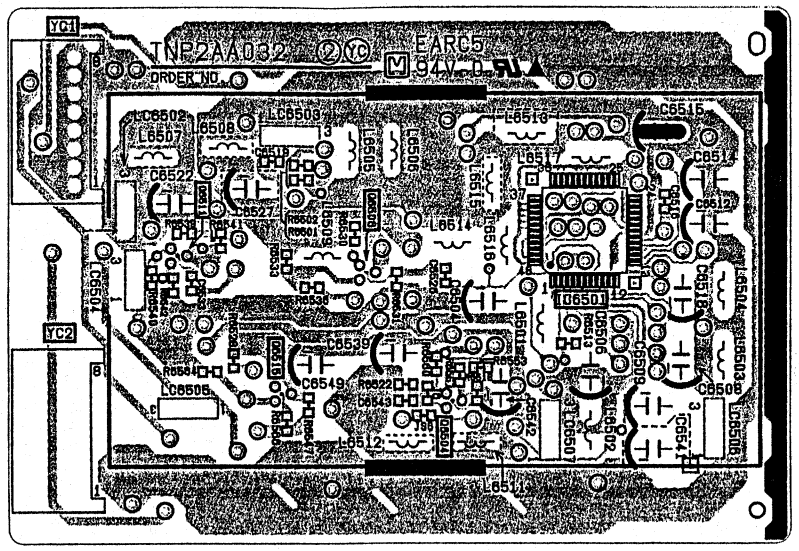
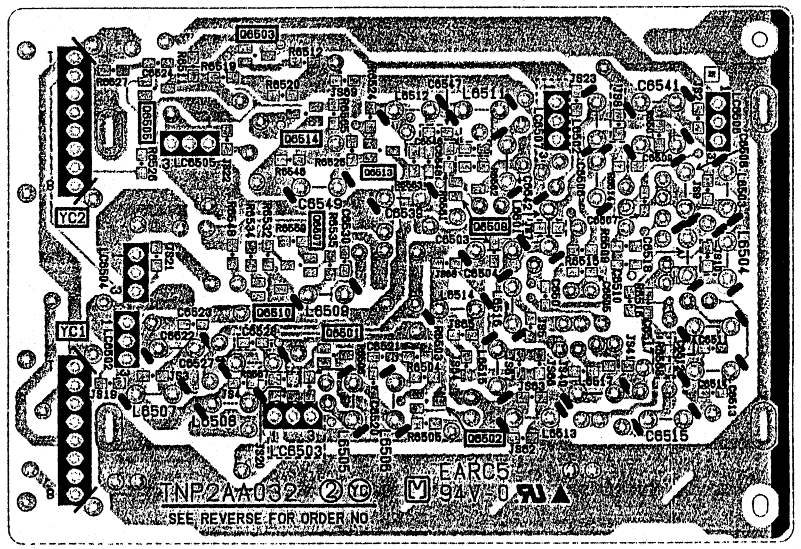
- R-Board - Remote Sensor
- S-Board - 2nd Tuner
- T-Board - Line Filter
- X-Board - AV Inputs
- Y-Board - PIP Processing
- YC-Board - Digital 3-line Comb Filter

1

YC-Board - Top (TNP2AA032)

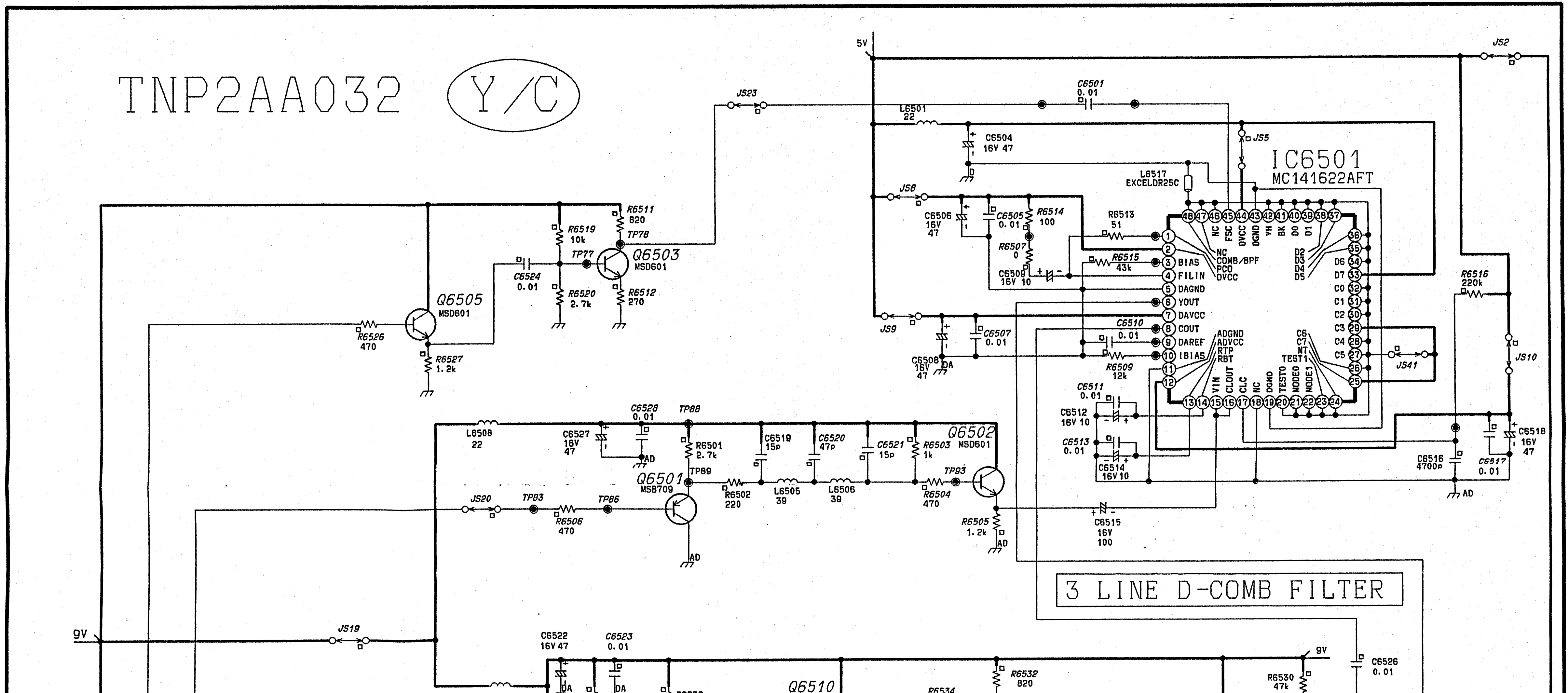

YC1
YC2
TNP2AA032
EARC5
94V-0
ORDER NO.
L6502
L6507
L6508
LC6503
C6522
C6527
L6505
L6506
L6513
L6514
L6515
L6517
C6516
C6504
C6518
C6512
C6509
C6506
C6549
C6526
C6543
C6502
C6541
C6542
C6501
C6511
C6508
L6512
L6501
L6504

YC-Board - Bottom (TNP2AA032)


YC1
YC2
Q6503
Q6505
Q6501
Q6502
Q6510
LC6505
LC6503
L6507
L6508
C6541
C6549
C6512
C6547
L6511
L6513
C6515
TNP2AA032
EARC5
94V-0
SEE REVERSE FOR ORDER NO.

2

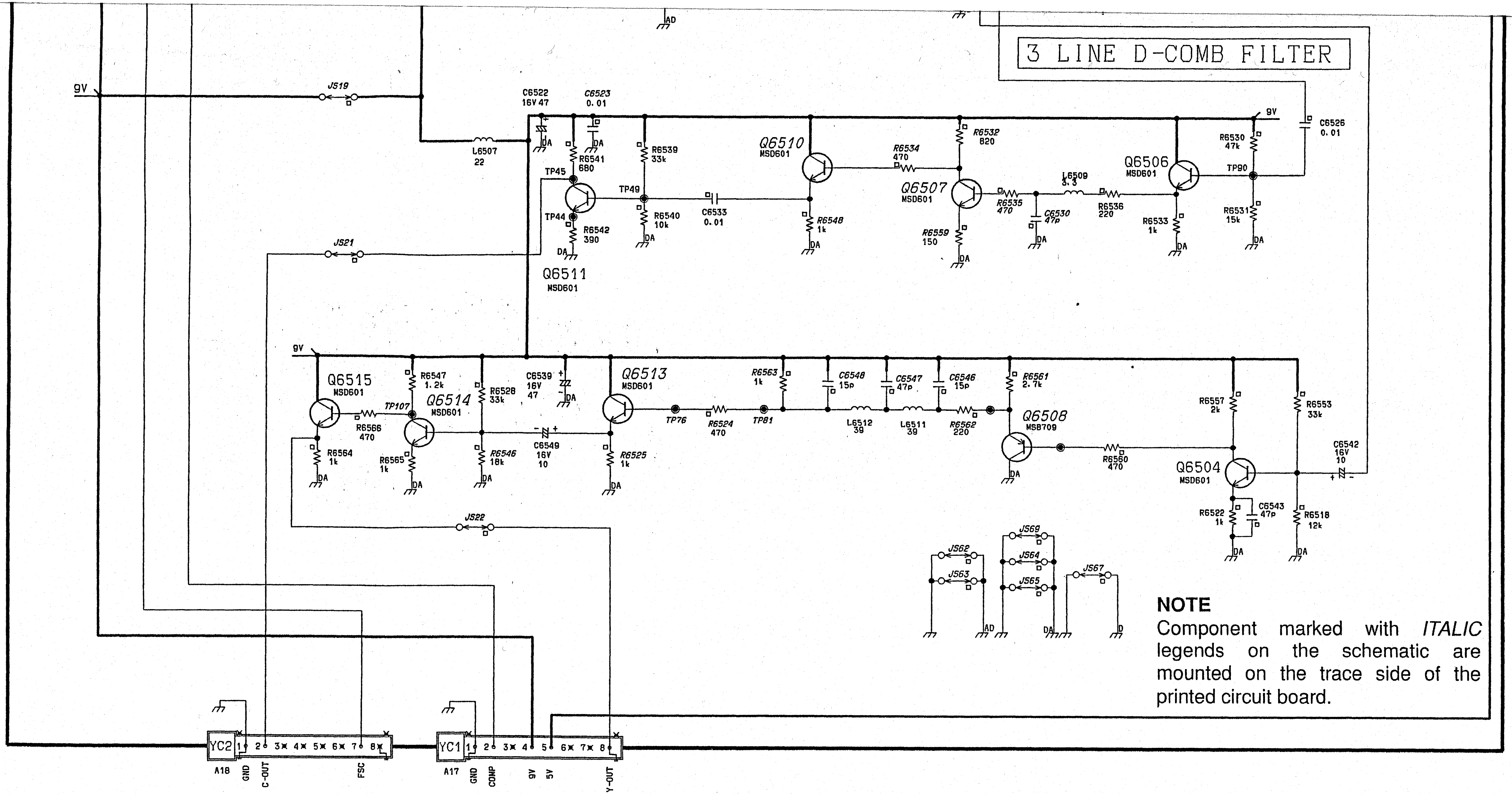
YC-Board Schematic


TNP2AA032
Y/C
5V
J523
C6501 0.01
L6501 22
C6504 16V 47
J55
IC6501
MC141622AFT
L6517 EXCELDR25C
J58
C6506 16V 47
C6505 0.01
R6514 100
R6513 51
R6507 0
R6515 43k
C6509 16V 10
J59
C6507 0.01
C6508 16V 47
C6510 0.01
R6509 12k
C6511 0.01
C6512 16V 10
C6513 0.01
C6514 16V 10
C6515 16V 100
NC
FSC
DVCC
DGND
VH
BK
D0
D1
NC
COMB/BPF
PCO
DVCC
BIAS
FILIN
DAGND
YOUT
DAVCC
COUT
DAREF
IBIAS
ADGND
ADVCC
RTP
RBT
VIN
CLOUT
CLC
NC
DGND
TEST0
MODE0
MODE1
D2
D3
D4
D5
D6
D7
C0
C1
C2
C3
C4
C5
C6
C7
NT
TEST1
J541
J52
R6516 220k
J510
C6518 16V 47
C6517 0.01
C6516 4700p
AD
R6511 820
TP78
R6519 10k
TP77
Q6503 MSD601
C6524 0.01
R6520 2.7k
R6512 270
Q6505 MSD601
R6526 470
R6527 1.2k
C6528 0.01
TP88
L6508 22
C6527 16V 47
R6501 2.7k
TP89
Q6501 MSB709
C6519 15p
C6520 47p
C6521 15p
R6503 1k
Q6502 MSD601
R6502 220
L6505 39
L6506 39
R6504 470
TP93
R6505 1.2k
J520
TP83
R6506 470
TP86
3 LINE D-COMB FILTER
9V
J519
C6522 16V 47
C6523 0.01
Q6510
R6532 820
R6534
R6530 47k
C6526 0.01
DA

3

3

4


3 LINE D-COMB FILTER
9V
JS19
C6522 16V 47
C6523 0.01
L6507 22
R6541 680
R6539 33k
TP45
TP44
TP49
R6542 390
R6540 10k
C6533 0.01
Q6511 MSD601
Q6510 MSD601
R6534 470
R6532 820
R6548 1k
Q6507 MSD601
R6559 150
R6535 470
C6530 47p
L6509 3.3
R6536 220
R6533 1k
Q6506 MSD601
R6530 47k
TP90
R6531 15k
C6526 0.01
JS21
Q6515 MSD601
R6547 1.2k
TP107
R6566 470
Q6514 MSD601
R6528 33k
C6539 16V 47
R6564 1k
R6565 1k
R6546 18k
C6549 16V 10
Q6513 MSD601
R6525 1k
TP76
R6524 470
TP81
R6563 1k
C6548 15p
C6547 47p
C6546 15p
L6512 39
L6511 39
R6562 220
R6561 2.7k
Q6508 MSB709
R6560 470
R6557 2k
R6553 33k
Q6504 MSD601
C6542 16V 10
R6522 1k
C6543 47p
R6518 12k
JS22
JS62
JS63
JS69
JS64
JS65
JS67
DA
AD
D
YC2
A18
GND
C-OUT
FSC
YC1
A17
GND
COMP
9V
5V
Y-OUT

NOTE
Component marked with *ITALIC* legends on the schematic are mounted on the trace side of the printed circuit board.

5

YC-Board Voltage Measurements (IC and Transistors)

IC6501			
1	2.14	25	0.00
2	4.86	26	GND
3	2.12	27	GND
4	2.14	28	GND
5	GND	29	0.00
6	0.87	30	GND
7	4.86	31	GND
8	0.90	32	GND
9	1.50	33	4.85
10	1.23	34	GND
11	GND	35	GND
12	4.86	36	GND
13	2.50	37	GND
14	0.50	38	GND
15	1.40	39	GND
16	1.40	40	GND
17	2.95	41	GND
18	GND	42	GND
19	GND	43	GND
20	GND	44	4.85
21	GND	45	2.26
22	GND	46	GND
23	GND	47	GND
24	GND	48	GND

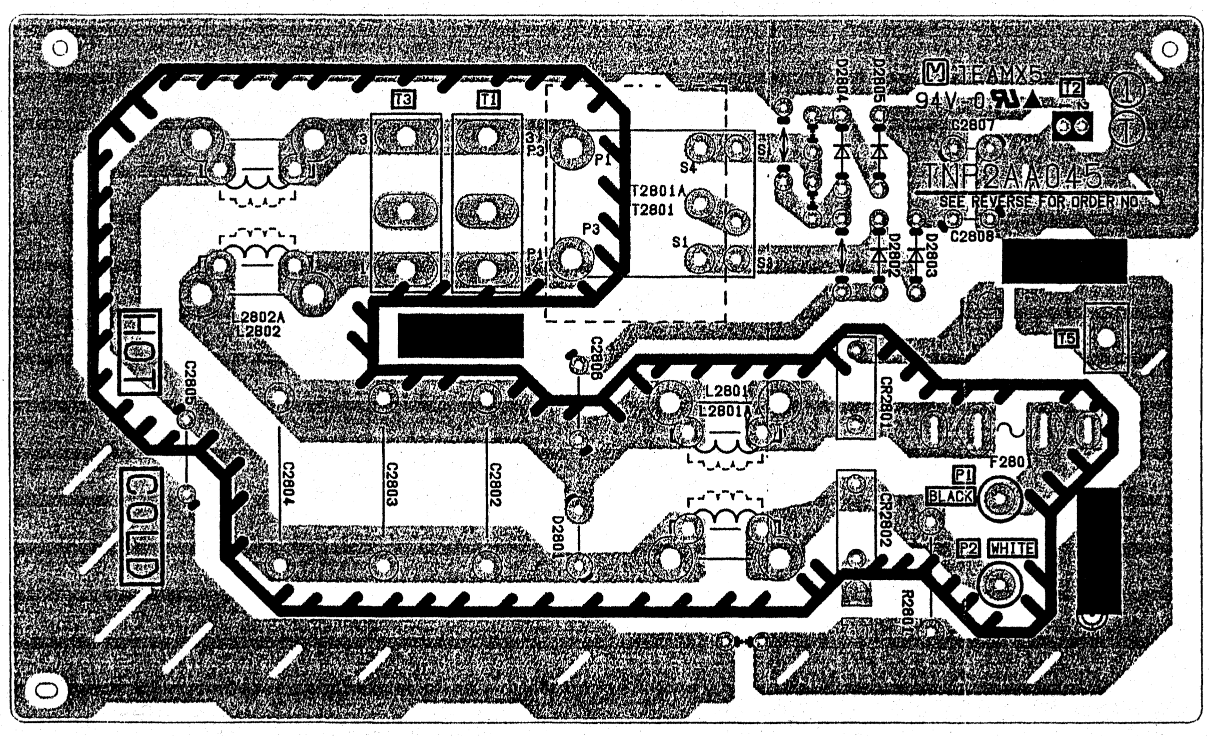
	Q6501	Q6502	Q6503	Q6504
B	3.75	5.19	1.86	2.28
C	GND	8.68	5.19	5.42
E	4.41	4.55	1.20	1.66

	Q6505	Q6506	Q6507	Q6508
B	6.41	1.95	1.33	5.44
C	8.71	8.65	5.08	GND
E	5.74	1.34	0.68	6.10

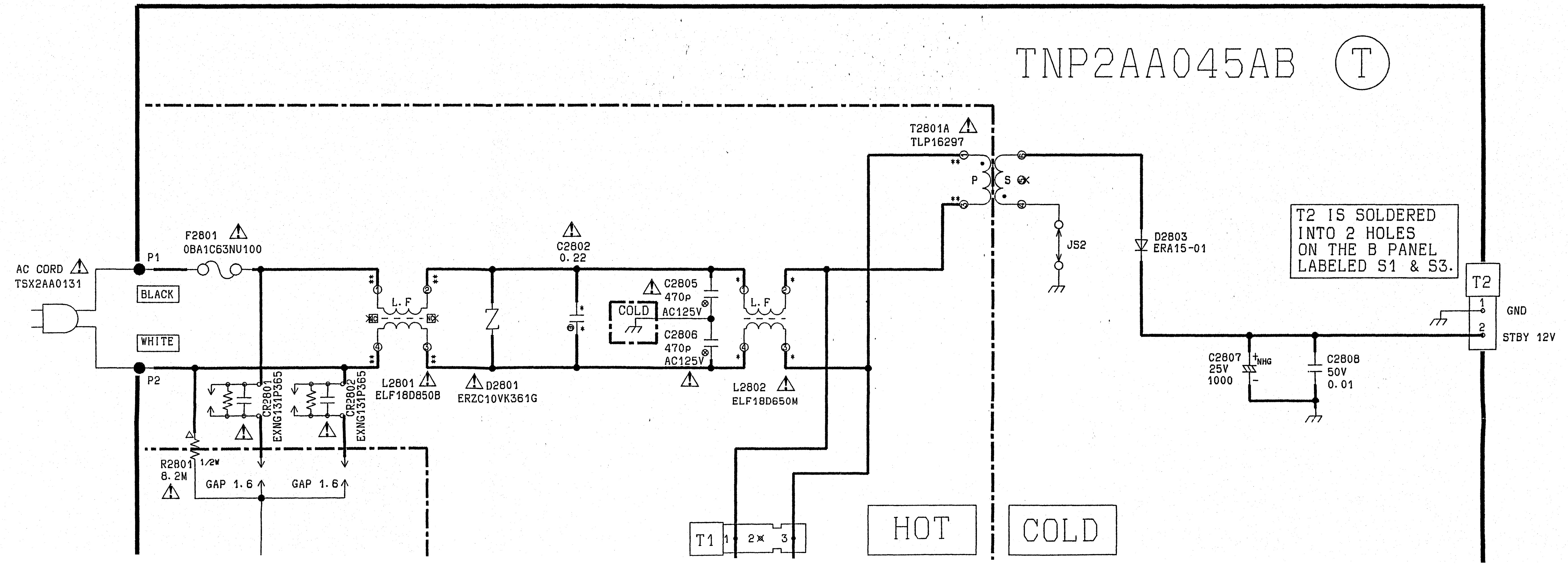
	Q6510	Q6511	Q6513	Q6514
B	5.07	1.90	6.55	2.93
C	8.65	6.45	8.66	5.90
E	4.42	1.26	5.89	2.30

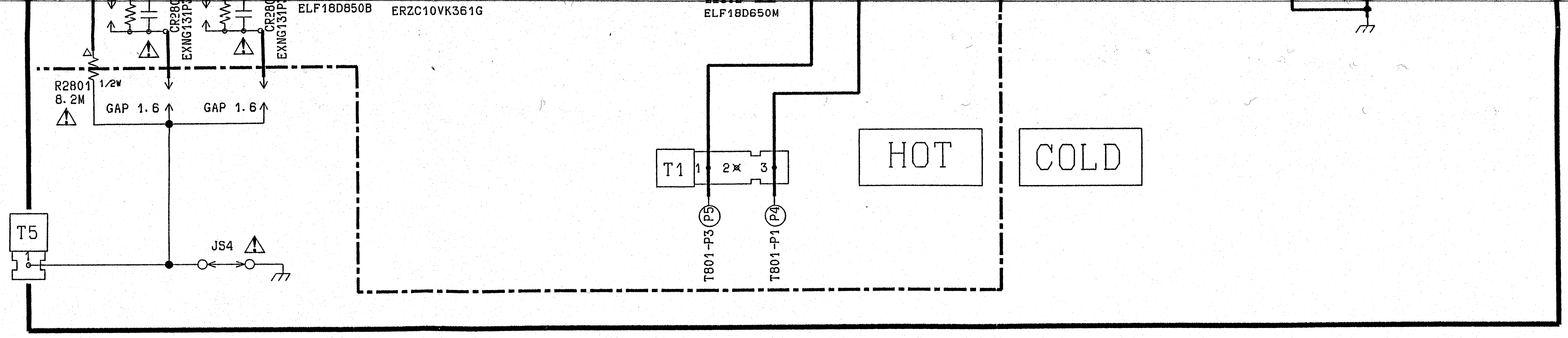
	Q6515
B	5.88
C	8.65
E	5.22

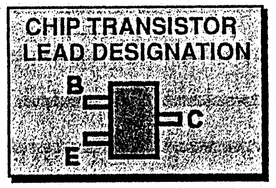
T-Board (TNP2AA045)


T3
T1
T2
T5
P1
P3
S4
S1
T2801A
T2801
L2802A
L2802
L2801
L2801A
C2806
C2804
C2803
C2802
C2805
C2807
C2808
D2801
D2802
D2803
D2804
D2805
CR2801
CR2802
F2801
R2801
P1 BLACK
P2 WHITE
HOT
COLD
94V-0
TNP2AA045
SEE REVERSE FOR ORDER NO.

T-Board Schematic


TNP2AA045AB
T
AC CORD
TSX2AA0131
P1
P2
BLACK
WHITE
F2801
0BA1C63NU100
CR2801
EXNG131P365
CR2802
EXNG131P365
R2801
8.2M
1/2W
GAP 1.6
GAP 1.6
L.F
L2801
ELF18D850B
D2801
ERZC10VK361G
C2802
0.22
COLD
C2805
470p
AC125V
C2806
470p
AC125V
L.F
L2802
ELF18D650M
T2801A
TLP16297
P
S
JS2
D2803
ERA15-01
C2807
25V
1000
NHG
C2808
50V
0.01
T2 IS SOLDERED
INTO 2 HOLES
ON THE B PANEL
LABELED S1 & S3.
T2
1
2
GND
STBY 12V
T1
HOT
COLD


ELF18D850B
ERZC10VK361G
ELF18D650M
CR280
EXNG131P
CR280
EXNG131P
R2801
1/2W
8.2M
GAP 1.6
GAP 1.6
T5
1
JS4
T1
1
2
3
P5
P4
T801-P3
T801-P1
HOT
COLD


CHIP TRANSISTOR
LEAD DESIGNATION
B
C
E

IMPORTANT SAFETY NOTICE

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MTC9903012C1

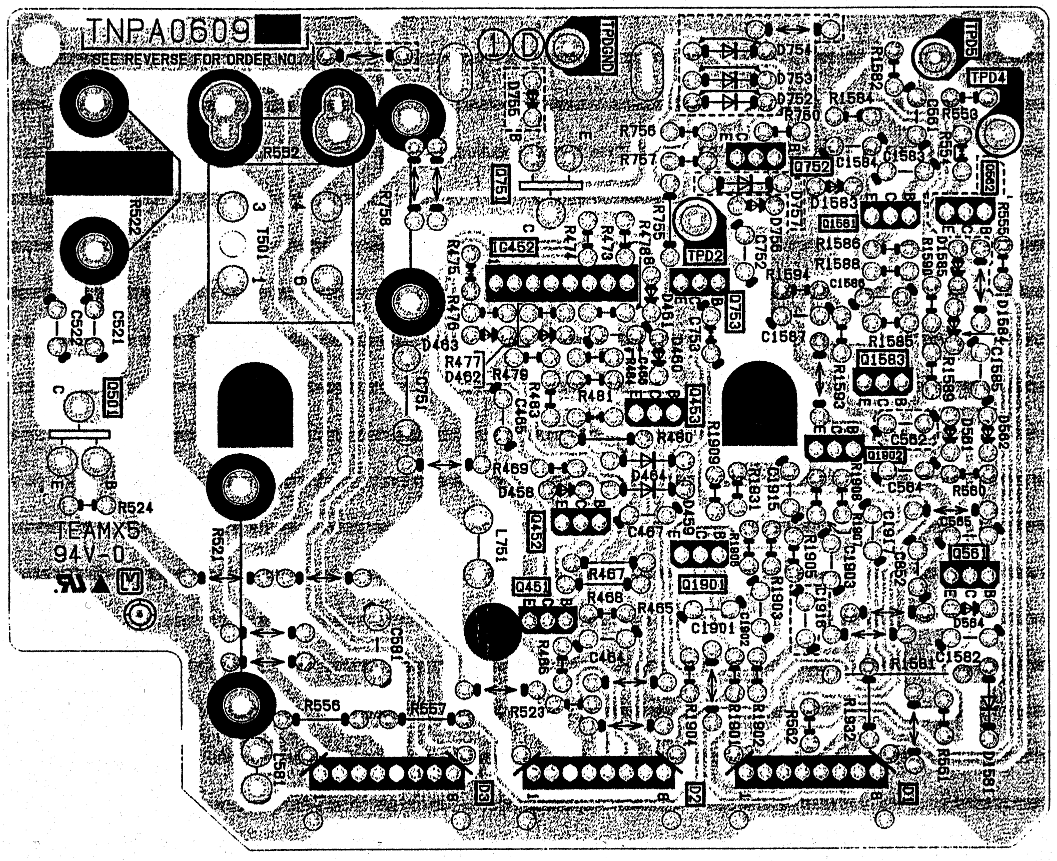
Sheet 4 of 5
Side B

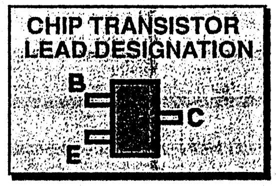
T & Y/C-Board Schematic,
Layouts & Voltages
PT-51G44A/CA, PT-51G54A/CA & PT-61G54A/CA

A B C D

1

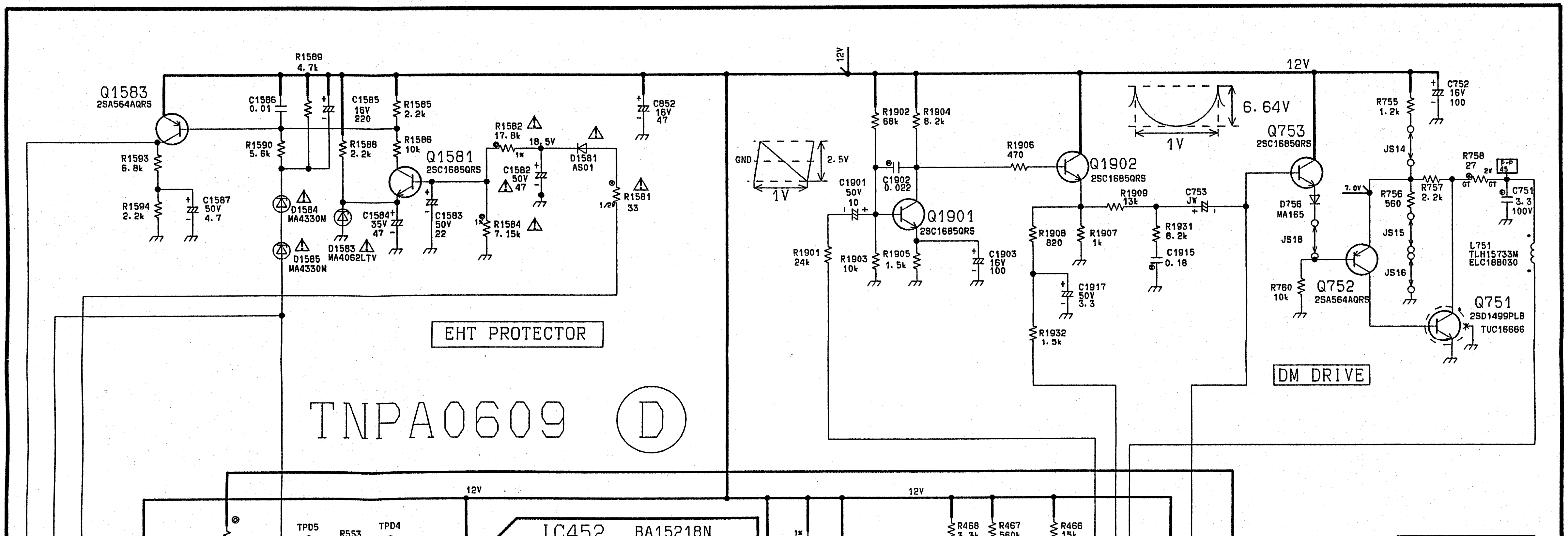
D-Board (TNPA0609)


TNPA0609
SEE REVERSE FOR ORDER NO.
IC452
Q1583
Q1581
Q1901
Q1902
Q451
TEAMX5
94V-0
T501
L751
TPD2
TPD4
TPD5
TPDGND

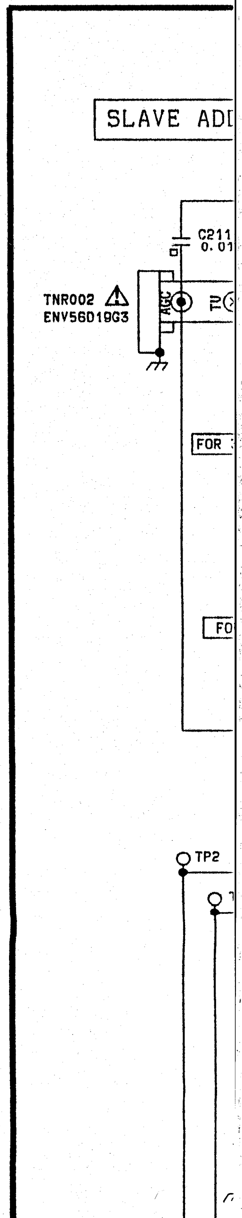

CHIP TRANSISTOR
LEAD DESIGNATION
B
C
E

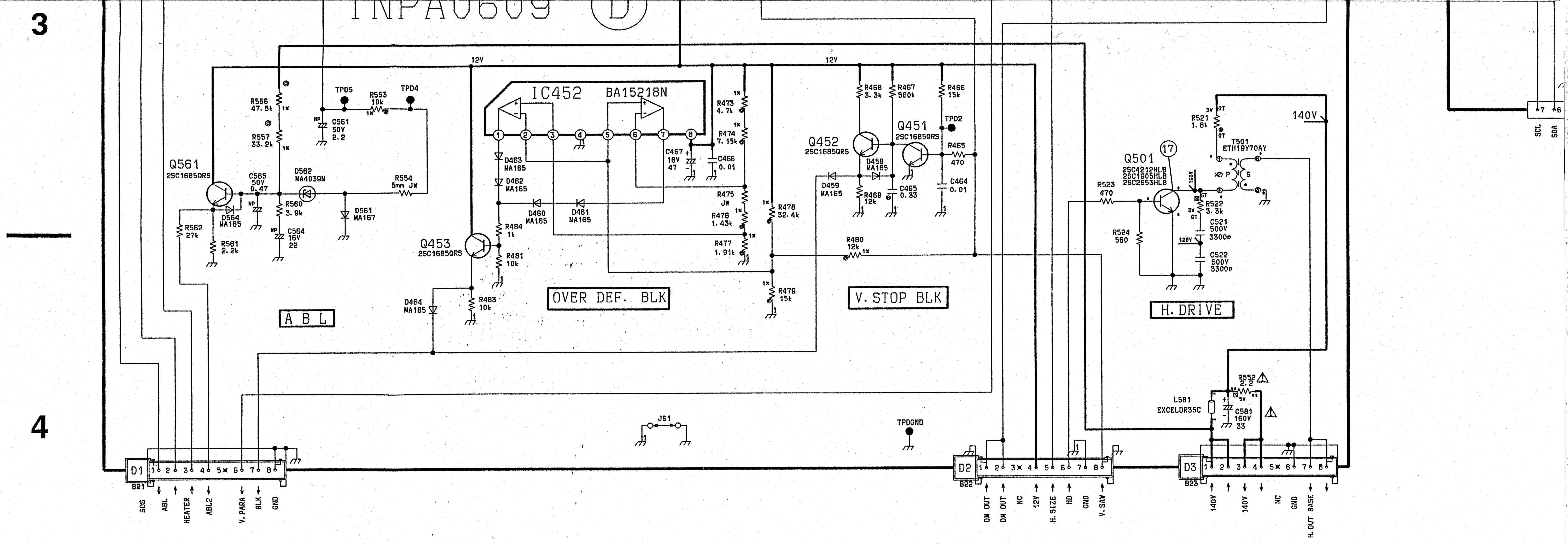
2

D-Board Schematic


Q1583
2SA564AQRS
R1589
4.7k
C1586
0.01
C1585
16V
220
R1585
2.2k
R1593
6.8k
R1594
2.2k
C1587
50V
4.7
R1590
5.6k
R1588
2.2k
R1586
10k
Q1581
2SC1685QRS
R1582
17.8k
18.5V
D1581
AS01
C1582
50V
47
C852
16V
47
R1581
33
D1584
MA4330M
D1585
MA4330M
D1583
MA4062LTV
C1584
35V
47
C1583
50V
22
R1584
7.15k
EHT PROTECTOR
TNPA0609
D
12V
GND
2.5V
1V
C1901
50V
10
C1902
0.022
R1902
68k
R1904
8.2k
Q1901
2SC1685QRS
R1901
24k
R1903
10k
R1905
1.5k
C1903
16V
100
R1906
470
Q1902
2SC1685QRS
6.64V
1V
R1909
13k
C753
R1908
820
R1907
1k
R1931
8.2k
C1915
0.18
C1917
50V
3.3
R1932
1.5k
12V
Q753
2SC1685QRS
R755
1.2k
C752
16V
100
JS14
D756
MA165
JS18
7.0V
R756
560
R757
2.2k
R758
27
C751
3.3
100V
JS15
JS16
L751
TLH15733M
ELC18B030
R760
10k
Q752
2SA564AQRS
Q751
2SD1499PLB
TUC16666
DM DRIVE
TPD5
R553
TPD4
IC452
BA15218N
R468
R467
560k
R466
15k

3


SLAVE ADI
C211
0.01
TNR002
ENV56D19G3
FOR
TP2


3
4
5
TNPA0609 D
12V
IC452 BA15218N
Q561 2SC1685QRS
R556 47.5k
R557 33.2k
TPD5
TPD4
R553 10k
C561 50V 2.2
C565 50V 0.47
D562 MA4039M
R554 5mm JW
D564 MA165
R560 3.9k
D561 MA167
R562 27k
R561 2.2k
C564 16V 22
A B L
D463 MA165
D462 MA165
D460 MA165
D461 MA165
Q453 2SC1685QRS
R484 1k
R481 10k
D464 MA165
R483 10k
C467 16V 47
C466 0.01
R473 4.7k
R474 7.15k
R475 JW
R476 1.43k
R477 1.91k
R478 32.4k
R479 15k
OVER DEF. BLK
Q452 2SC1685QRS
Q451 2SC1685QRS
R468 3.3k
R467 560k
R466 15k
TPD2
R465 470
D458 MA165
D459 MA165
R469 12k
C465 0.33
C464 0.01
R480 12k
V. STOP BLK
Q501 2SC4212HLB 2SC1905HLB 2SC2653HLB
17
R521 1.8k
R523 470
R524 560
R522 3.3k
C521 500V 3300p
C522 500V 3300p
T501 ETH19Y70AY
140V
H. DRIVE
L581 EXCELDR35C
R552 2.2
C581 160V 33
JS1
TPDGND
D1 B21
SOS ABL HEATER ABL2 V. PARA BLK GND
D2 B22
DW OUT DW OUT NC 12V H. SIZE HD GND V. SAW
D3 B23
140V 140V NC GND H. OUT BASE
SCL SDA

D-Board Voltage Measurements (IC & Transistors)

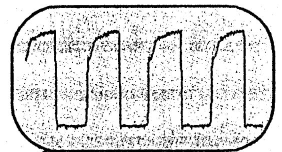
IC452	
1	1.21
2	2.01
3	1.49
4	GND
5	2.01
6	2.60
7	1.21
8	11.80

	Q451	Q452	Q453	Q501
B	0.26	0.18	0.00	0.35
C	0.18	11.80	11.80	92.10
E	GND	0.00	0.38	GND

	Q561	Q751	Q752	Q753
B	3.46	0.55	6.67	7.86
C	11.80	27.00	0.54	11.80
E	2.65	GND	7.16	7.24

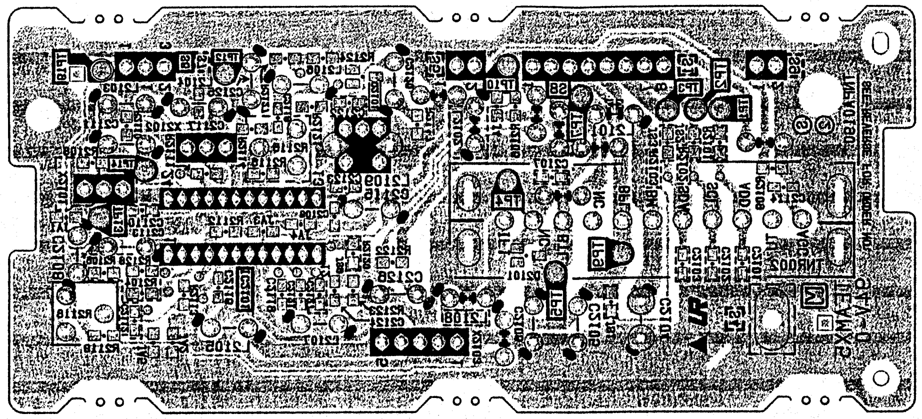
	Q1581	Q1583	Q1901	Q1902
B	5.77	11.80	1.48	6.79
C	11.80	0.00	6.81	11.80
E	6.02	11.80	0.87	6.12

Waveform - D-Board

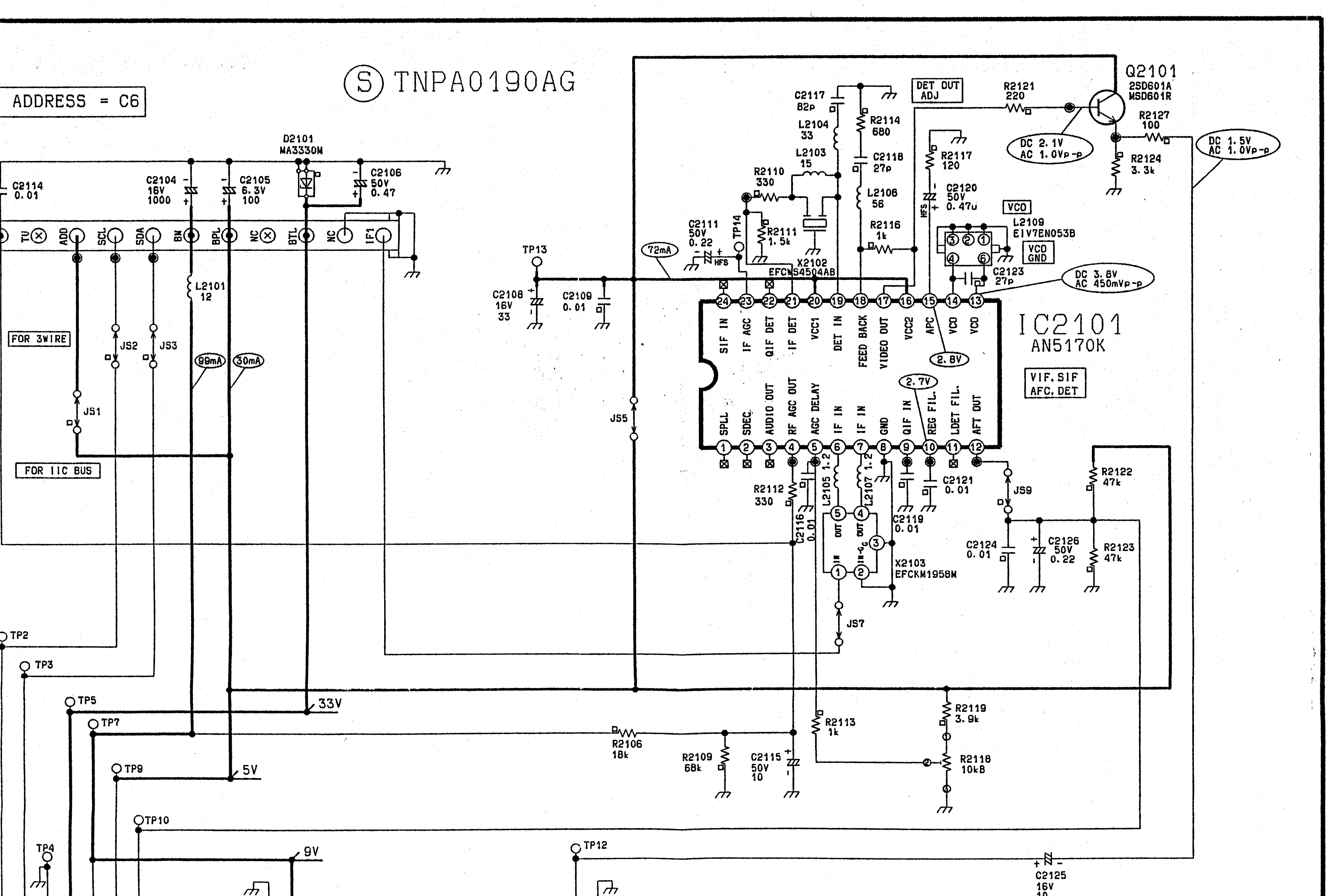


⑰ 202.0V p-p [20µs]
Q501-Collector (H DRIVE)

S-Board (TNPA0190)

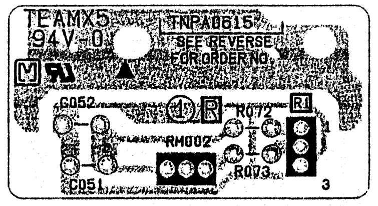


S-Board Schematic

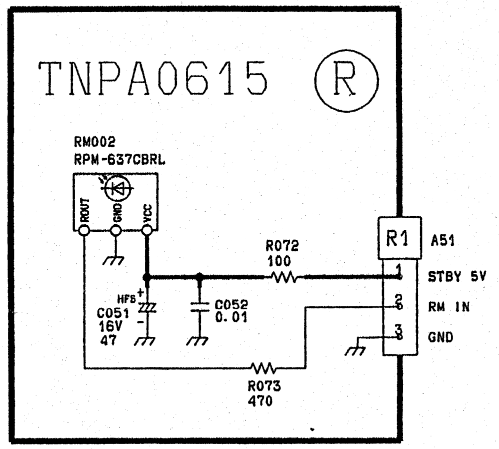


S TNPA0190AG
ADDRESS = C6
D2101 MA3330M
C2114 0.01
C2104 16V 1000
C2105 6.3V 100
C2106 50V 0.47
TU ADD SCL SDA BN BPL NC BTL NC IF1
L2101 12
FOR 3WIRE
JS1 JS2 JS3
90mA 30mA
FOR IIC BUS
TP2 TP3 TP5 TP7 TP9 TP10 TP4 TP12 TP13 TP14
33V
5V
9V
C2108 16V 33
C2109 0.01
C2111 50V 0.22
72mA
R2110 330
R2111 1.5k
X2102 EFCWS4504AB
C2117 82p
L2104 33
L2103 15
R2114 680
C2118 27p
L2106 56
R2116 1k
DET OUT ADJ
R2121 220
Q2101 2SD601A MSD601R
R2127 100
R2124 3.3k
DC 2.1V AC 1.0Vp-p
DC 1.5V AC 1.0Vp-p
R2117 120
C2120 50V 0.47u
VCO
L2109 E1V7EN053B
VCO GND
C2123 27p
DC 3.8V AC 450mVp-p
SIF IN IF AGC QIF DET IF DET VCC1 DET IN FEED BACK VIDEO OUT VCC2 APC VCO VCO
IC2101 AN5170K
VIF.SIF AFC.DET
2.8V 2.7V
SPLL SDEC AUDIO OUT RF AGC OUT AGC DELAY IF IN IF IN GND QIF IN REG FIL. LDET FIL. AFT OUT
JS5
R2112 330
L2105 1.2
L2107 1.2
C2116 0.01
C2119 0.01
C2121 0.01
X2103 EFCKM1958M
JS7 JS9
C2124 0.01
C2126 50V 0.22
R2122 47k
R2123 47k
R2106 18k
R2109 68k
C2115 50V 10
R2113 1k
R2119 3.9k
R2118 10kB
C2125 16V

R-Board (TNPA0615)

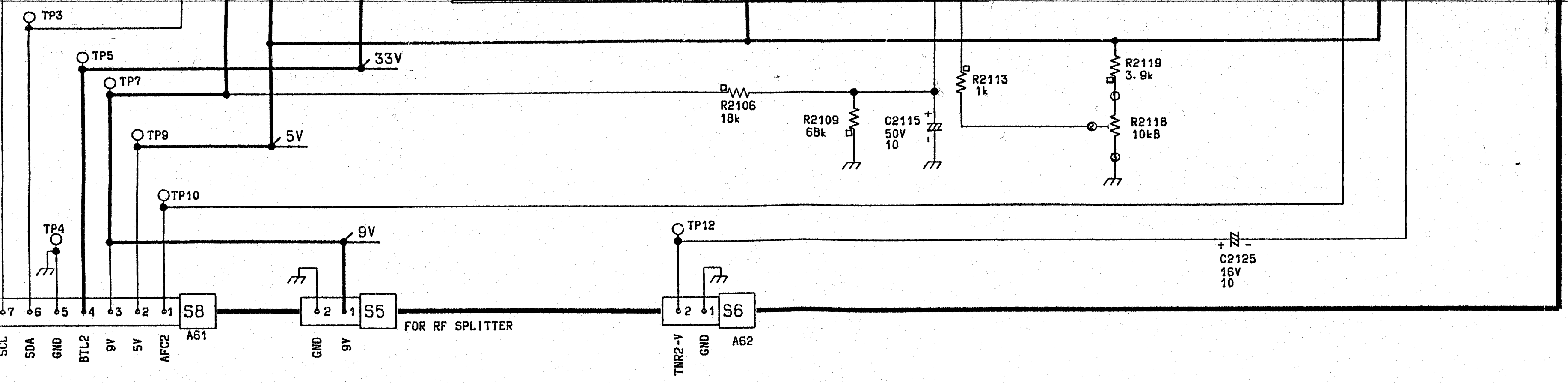


R-Board Schematic



TNPA0615 R
RM002 RPM-637CBRL
ROUT GND VCC
R072 100
C051 16V 47
C052 0.01
R073 470
R1 A51
STBY 5V
RM IN
GND

K-Board (TNPA0614)


TP3
TP5
TP7
TP9
TP10
TP4
TP12
33V
5V
9V
R2106
18k
R2109
68k
C2115
50V
10
R2113
1k
R2119
3.9k
R2118
10kB
C2125
16V
10
S8
A61
S5
FOR RF SPLITTER
S6
A62
SCL
SDA
GND
BTL2
9V
5V
AFC2
GND
9V
TNR2-V
GND

S-Board Voltage Measurements (IC & Transistor)

IC2101	
1	n.c
2	n.c
3	n.c
4	5.02
5	2.43
6	2.61
7	2.61
8	GND
9	2.61
10	1.20
11	n.c
12	2.56
13	3.61
14	3.61
15	2.78
16	4.94
17	1.84
18	1.90
19	1.76
20	4.94
21	1.76
22	n.c
23	2.42
24	n.c

	Q2101
B	1.84
C	4.94
E	1.24

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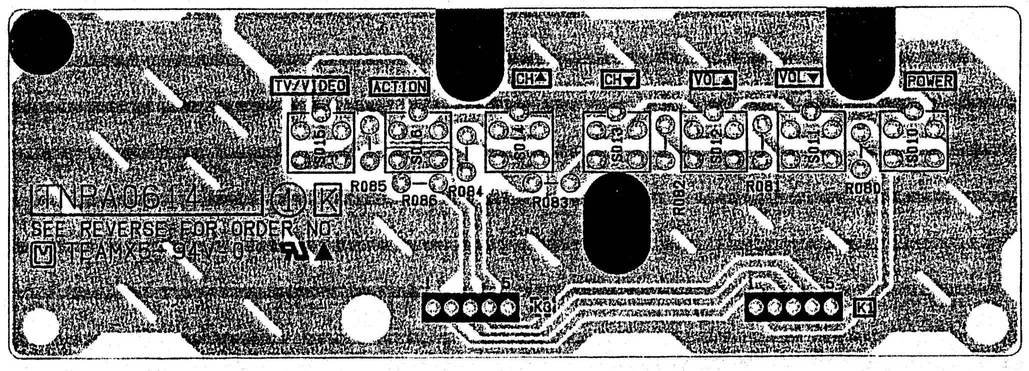
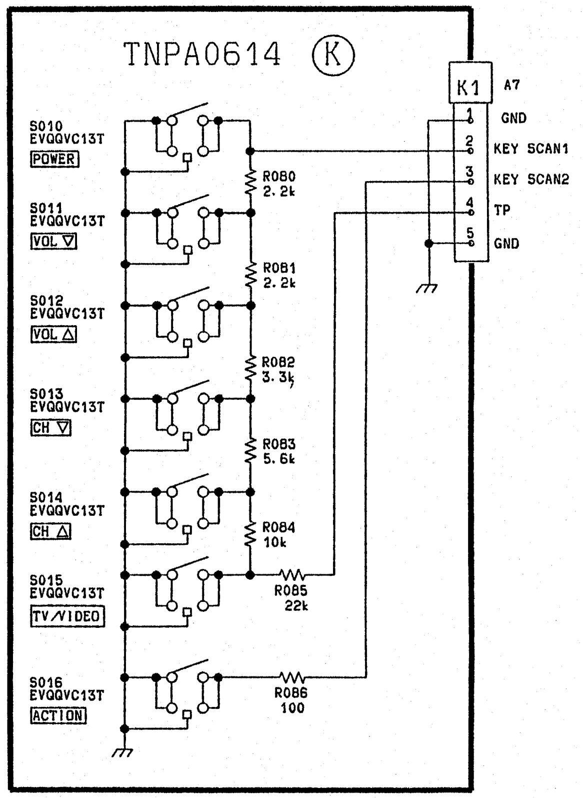
K-Board (TNPA0614)


TV/VIDEO
ACTION
CH▲
CH▼
VOL▲
VOL▼
POWER
R085
R086
R084
R083
R081
R080
TNPA0614 K
SEE REVERSE FOR ORDER NO.
K1

K-Board Schematic


TNPA0614 (K)
K1
A7
1 GND
2 KEY SCAN1
3 KEY SCAN2
4 TP
5 GND
S010 EVQQVC13T POWER
S011 EVQQVC13T VOL ▽
S012 EVQQVC13T VOL △
S013 EVQQVC13T CH ▽
S014 EVQQVC13T CH △
S015 EVQQVC13T TV/VIDEO
S016 EVQQVC13T ACTION
R080 2.2k
R081 2.2k
R082 3.3k
R083 5.6k
R084 10k
R085 22k
R086 100

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR

TYPE		TOLERANCE	
C	Carbon	F	+/- 1%
F	Fuse	J	+/- 5%
M	Metal Oxide	K	+/- 10%
S	Solid	M	+/- 20%
W	Wire Wound	G	+/- 2%

RES, C 270-J-1/4

CAPACITOR

TYPE		TOLERANCE	
C	Ceramic	C	+/- 0.25pF
E	Electrolytic	D	+/- 0.5pF
P	Polyester	F	+/- 1pF
S	Styrol	J	+/- 5%
T	Tantalum	K	+/- 10%
		L	+/- 15%
		M	+/- 20%
		P	+10% -0%
		Z	+80% -20%

CAP, P .068UF-K-50V

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model ______________________________ Ser #____________ Date______________

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Sub Adjustments					
B0	SUB-COLOR	0 ~ 63	27		
B1	SUB-TINT	0 ~ 63	50		
B2	SUB-BRIGHTNESS	0 ~ 255	50		
B3	SUB-PICTURE	0 ~ 63	25		
B4	KILLER/ABL/ GAMMA	0 ~ 7	5		
B5	VIDEO ADJUSTMENT	0 ~ 15	8		
B6	AUDIO ADJUSTMENT	0 ~ 31	23		
Cut-Off Adjustments					
C0	CUT-OFF R	0 ~ 1 0 ~ 255	0 150		
C1	CUT-OFF G	0 ~ 255	764		
C2	CUT-OFF B	0 ~ 1 0 ~ 255	0 78		
C3	DRIVE R	0 ~ 255	32		
C4	DRIVE B	0 ~ 255	43		
C5	YNR SWITCH	0 ~ 1	0		
C6	AFT	0 ~ 1 0 ~ 128	0 122		
C7	RF-AGC	0 ~ 255	64		
C8	YNR VIDEO ADJUSTMENT	0 ~ 7	0		
C9	HORIZONTAL CENTER	0 ~ 31	14		
Ca	BEAM LIMIT	0 ~ 7	5		
Cb	VCJ TEST H	0 ~ 2	0		
Cc	B.P.F. SWITCH	0 ~ 1	1		
MTS Adjustments					
M0	INPUT LEVEL	0 ~ 63	35		
M1	STEREO PLL/VCO	0 ~ 63	34		
M2	FILTER	0 ~63	25		
M3	LOW-LEVEL SEPARATION	0 ~ 63	37		
M4	HIGH-LEVEL SEPARATION	0 ~ 63	23		

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Options Adjustments					
S0	PIP COLOR	0 ~ 127	125		
S1	PIP CONTRAST	0 ~ 127	37		
S2	UP 1/9	0 ~ 255	25		
S3	DOWN 1/9	0 ~ 255	149		
S4	LEFT 1/9	0 ~ 255	7		
S5	RIGH 1/9	0 ~ 255	107		
S6	UP 1/16	0 ~ 255	25		
S7	DOWN 1/16	0 ~ 255	165		
S8	LEFT 1/16	0 ~ 255	7		
S9	RIGH 1/16	0 ~ 255	124		
Sa	FREERUN	N/A	N/A		
Sb	CLOCK ADJUSTMENT	0 ~ 255	161		
Sc	PIP TINT	0 ~ 63	50		
Sd	LOUDNESS COMPENSATION	0 ~ 63	52		
Comb Filter Adjustments					
V0	Static Dig. Conv.	TOGGLE	0		
V1	Dinamic Digital Conv.	0 ~ 99	12		
V2	BLUE GAMMA	0 ~ 255	15		
V3	VERTICAL SIZE	0 ~ 255	89		
V4	HORIZONTAL SIZE	0 ~ 255	95		
V5	SUB SHARPNESS	0 ~ 99	33		

V99032620CM0507

Printed by: Schaltungsdienst Lange, Berlin (GERMANY)